Food Manufacture

The Journal of the Food Industry

Vol. VI. August, 1931 No. 8

The Way Out.

THIS ISSUE reviews recent developments in the chocolate and confectionery industries. The first thoughts occurring to one run somewhat like this: "Well, I can't see what there is to write about. Bad news is best left unsaid. Not much fun in listening to Dismal Johnny talk about trade depression and so on!"

To this we would reply to the effect that it is generally possible to extract some good out of evil —without actually quoting Biblical text in support. It is in fact the case that, despite bad trade and troublesome times, there is much in the way of definite progress to report. Keener competition and adverse circumstances invariably result in increased efficiency, improved methods of production, bright ideas of display and salesmanship, and so on, and although their effects may not be sufficiently apparent to dispel the gloom during the period of readjustment, they must, according to the nature of things, drag those who have the necessary grit and adaptability on to a new plane of stabilised prosperity.

Adaptability.

We make no complaint about any lack of grit in this country, but what we do want to see is more adaptability in industrial circles. By this we mean that it would be a good thing if manufacturers in general were to take a keener interest in new ideas, new developments in plant and machinery, new processes and ways of doing things. It is well known that one of the most difficult jobs anyone can take on is to pioneer a piece of plant or a process which differs in greater or less degree from "established" design or practice. This is an interesting little study in psychology which we do not propose to pursue. However, the point is that we run grave risks of stagnation in being overcautious and in displaying a lack of sympathy towards novelty in ideas, plant, processes and whatnot. We are overprone to sit on the fence and wait for the other fellow to try it out, and the other fellow decides to wait for some other fellow, and so nobody gets anywhere. Always the pioneer is met with, "Well, it sounds all right, but where can we see one of these things working?"

Now, one would imagine that any manufacturer who prided himself in being "up to date" and knowing his job "from A to Z" would be able to come at once to a clean-cut conclusion as to the value of any new proposition in his own line of business merely by casting his eye over a few engineering drawings and figures. But no; he squints at the drawings and is polite towards the figures, looks wise, doubtful, faintly amused, bored, sceptical, amiable, and pitying—all in one—and displays the acme of "commonsense" by shrugging his shoulders, jingling some loose cash in an otherwise empty pocket, and uttering the profound thought: "Well, it *may* be all right, but where can I see one working?" Of course, it would not be polite to make the obvious retort!

For Example.

Having reached this stage, one feels that it would be neither good form nor good "cricket" to particularise. If we were addressing ourselves to a German congregation this aspect of things would not arise. We should simply be downright honest and get the matter off our chest, and hang the consequences. Thus, many will have derived much amusement (plus, we hope, some benefit) from the pugilistic efforts of Herr Rieck, the lusty editor of *The Gordian*, which serves the German cocoa and chocolate industries. His battle-cries, interspersed with moans, groans, curses, and pleadings, have resounded throughout

Europe—and beyond, for all we know. For several years this has been going on; what Herr Rieck would like to do is to execute a war-dance on the graves of all those stupid cocoa planters who are so utterly slipshod and antiquated as to ignore the teachings of science and potter along in the same old hopelessly inefficient way as their grandfathers. We add our tears to those of the inestimable Rieck, but, at the same time, we would like to know what he is going to do about it. We have looked to him in vain for constructive suggestions, but he has none to offer. Instead (and here is another interesting bit of psychology) he turns like an infuriated bull on anyone who dares to offer anything in the way of useful suggestions, thereby not adding much to the dignity of his *Gordian*. It is a pity.

Chocolate-Milk.

This new factor in the German milk industry was dealt with at Copenhagen by Dr. Schweigart on the occasion of last month's International Dairy Congress. He said that in order to fight against "milk weariness," "milk indifference," as well as "milk antipathy," it had been found necessary to alter the taste of milk through the introduction of chocolate-milk, with good results, about eighteen months ago.

The main consumers of this product are schoolchildren and factory hands; at a number of dairies the demand was greater than for ordinary milk. In its manufacture is used a mixture of one-quarter whole milk and three-quarters skimmed milk, to which is added 8 to 10 per cent. of the chocolate ingredient.

Dr. Schweigart also referred to the concentrated product "Schokotrunk," in which cocoa and milk are combined and which is stirred up with water before use. This product is stated to be of special interest to sportsmen, "Wandervögel," and tourists.

Stassanisation.

One of the most interesting of the Congress papers was that of A. P. Hansen, the Director of the State Experiment Dairy of Hillerod, Denmark. This related to a particular form of a heat treatment of milk, known as "stassanisation," which consists in circulating the milk in layers of 1 to 1¼ millimetres thick in a closed pipe system, subjecting it to heat treatment for about fifteen seconds without access of air and without superheating any part of the milk. It is apparently named after Dr. Henri Stassano of the Central Milk Station at Strasbourg.

It is stated that the requisite plant consists of (1) a regenerating section of eight tubes, each 3½ metres in length, (2) a heat treatment section (the stassanisator) of eight tubes, each 2½ metres in length, and (3) a cooling section of eight tubes, each 3½ metres in length.

Dr. Stassano claims a number of advantages and no disadvantages for his method, and from Hansen's tests most, if not all, of these claims appear not to be exaggerated. No evaporation and no loss takes place. There is no change in the natural odour or taste. The cream separation is far superior to that of high-pasteurised milk. There is practically no change in curdling quality, nor are clean-skimming, chemical composition, and vitamin content changed to any appreciable degree. From 99·4 to 99·9 per cent. of the ordinary bacterial flora was destroyed, including all *B. coli*, *B. abortus*, and *B. tuberculosis*. Finally, it was found that the consumption of steam, water, and power was less than in the case of the ordinary methods of pasteurisation.

Obviously this new departure warrants serious attention.

The Chemical Plant Exhibition.

It is a fair indication of the success of the British Chemical Plant Exhibition which has just closed its doors at Westminster that plans are already being laid for a repetition of the event. The exhibitors, as a matter of fact, have already been asked to send a statement of their views on a number of points to the managing committee so that these can be considered as a guide to future arrangements, and a meeting on the same subject is to be held in the autumn. The Central Hall is, admittedly, not an ideal site for such an event, and its limitations imposed a number of inconveniences on exhibitors; at the same time, however, it was chosen only after full consideration and, no doubt, for excellent reasons, so that the lapses can easily be avoided in the future. The main points, after all, are that nearly 4,000 visitors attended—a very good number for a technical display, and that all the exhibiting firms whom we had the opportunity of asking informed us that they had every reason to be satisfied with the business done. It seems, then, that the foundations have been laid for a succession of exhibitions at regular intervals, and we have no doubt that such a venture would be welcome to all who participated in the last.

Flour, Bread, and Vitamins.

Flour and farina irradiated with ultra-violet rays have been put on the market in Germany and investigations on these products have been carried out by Schwarz and Sieke (*Münch. Med. Woch.*, October 17, p. 1801, 1930). Tested shortly after irradiation they may be found to have antirachitic properties, but oxidation appears to decrease or destroy the vitamin D content. The irradiated preparations cost three times as much as those not treated. This subject is further discussed by Tisdall, Drake, and Brown (*Canadian Med. Assoc. Journ.*, p. 210, 1930).

The authors state that although the refined grain products which bulk so largely in the modern diet are deficient in vitamins, an additional supply of vitamin B_1 and E may be made available by incorporating wheat germ in bread. An additional general supply of vitamin D may be made available by also incorporating it in the bread. The vitamin D does not change in any way the appearance or taste of the bread. They state that bread is a particularly suitable carrier for vitamins on account of its universal distribution and its large consumption by the wage-earning class, who frequently cannot afford to buy the more expensive vitamin-containing foods.

Bloom.

There is scarcely a term more difficult to define than bloom. It is something intangible, indefinite, and yet quite existent. We talk of the bloom of a peach, the bloom of a rose, and the blush of the blooming bride, and are conscious of some pleasing feature inherent in the peach or the rose, but it is difficult to dissociate the feature from the object. The term bloom has been introduced into confectionery, and in some cases it is a desirable feature and sometimes not. The bloom of chocolates, which is caused by improper tempering or incorrect temperature and humidity during manufacture, is not a property to send the chocolate manufacturer into rhapsodies of joy, and much money has been spent on research to avoid its development. In bakery products, however, the term bloom is used to denote a desirable feature of cakes or loaves, and, in the case of bread, it is largely a matter of the sugar used and correct fermentation. The crust colour may be due to several causes, the reddish-brown, "foxy" tinge is produced by under-fermentation, but, if the dough has been fermented correctly and there is a sufficiency of sugar, the rich golden brown colour so desired by the baker is obtained. No matter how correct the baking procedure, a deficiency of sugar will cause a pale loaf with no bloom. Over-fermentation of the dough destroys the bloom of the loaf, and greyish streaks appear on the crust. Ford, writing in the current issue of the *Arkady Review*, states that "The bloom of a loaf means more than the crust colour, and cannot wholly be accounted for by the sugars present in the dough during baking, although, obviously, these do play an important part in the production of bloom." With this we are in entire agreement, and believe that that velvety sheen so prized by bakers is largely dependent on those obscure changes which take place in the fermentation stages; changes which are worthy of further investigations.

Patent Flour.

Although this is one of the most frequently used terms in the bakery trade, it is surprising how many people who use it are very vague as to its real meaning and significance. The term "patent grade" came from America, and was the result of the introduction of the purifier into milling practice. About 1870 a Minneapolis miller, George Christian, performed the then wonderful feat of milling flour from Minnesota wheat which could compete with the Kansas winter wheat flour. In conjunction with Le Croix, who was skilled in the making of purifiers, Christian perfected a process whereby excellent quality flour was obtained. As this flour was milled by a special patented process, it became known as "patent flour." Now the term is used to signify the highest grade of flour made. Nowadays most millers divide their flour and make at least two grades, and the top grade, which obviously commands a higher price, is termed patent flour. It can be assumed that patent flour consists of the purest parts of the endosperm of the wheat berry with the least possible amount of branny particles. The term patent flour does not denote or imply that the flour has undergone any special treatment by improvers or other processes, as many people seem to imagine.

Holes in Bread and Cakes.

In the judging of cakes and loaves in competitions, one of the points to which the judge pays particular attention is the uniformity of aeration. There are two types of holes to be found in most loaves and cakes, the preponderating type being the small holes which, viewed *en masse*, present a honeycomb appearance. In addition to these are larger holes of uneven size and shape, which spoil the regularity of the surface. The presence of these large holes may not affect the flavour or nutritive value, but they offend the æsthetic sense of the observer, and subconsciously suggest some irregularity in baking or some fault in the flour. The question of holes in cut bread and cakes is one which gives the judge much worry, and it is difficult to say how far they influence his judgment. At a recent exhibition at Islington one could not fail to notice the presence, in greater or less quantity, of irregular-shaped holes in almost every entry, and of the winning loaves none were absolutely free from them. The main cause of these irregular holes scattered amongst the uniform honeycomb structure is uneven mixing. Hence the absence of large holes suggests to the judge uniformity of mixing. Much depends on the moulding of the dough, and there is a greater tendency to irregularity in hand-moulded loaves, but it is also possible to obtain a too tight loaf by machine moulding if the machine is too closely set. It has been suggested that the irregular-shaped holes are due to the peculiar habit of the yeast when budding, the cells tending to form chains rather than separating into individual units. This theory, however, does not explain the

irregularities of texture obtained in cakes, where no yeast has been used, and aeration is dependent on baking-powder. In this case two factors come into play, adequate mixing and particle size of the raising ingredients. It is not a simple matter to mix inorganic crystals with flour particles, and, unless very efficient mixing machines are used, irregular aeration will result. The bicarbonate and acid particles should be approximately the same size as the flour particles. Raising ingredients should be dressed through flour silks to ensure this. In cake making it is safer for the baker to use a self-raising flour which has been so dressed than to attempt to incorporate baking-powders in inadequate mixers. To those bakers and confectioners aspiring to exhibition products the question of regular aeration is of great importance.

Flavour in Bread.

The question of flavour in bread is very vexed, and one upon which a multitude of opinions have been expressed. There seems to be a widespread view that the flavour of modern bread is not so pleasant as that of our grandfathers' day. It is difficult to say what is the cause of flavour in bread. An old-fashioned baker once, when discussing the difference between modern and old-fashioned bread, put it down to the increased use of machinery in bread making, saying that, in his opinion, this modern bread "lacks the aroma of the 'uman 'and." It has been suggested that the flavour is produced as a by-product from proteins, and that it is composed of molecules of volatile oils or other similar materials. It may also be true that flavour in bread is produced by the activities of micro-organisms on the proteins. The relatively simple production of the highly flavoured glutamic acid from wheat gluten lends some support to this view. Some people lean to the opinion that the mechanics of milling may be responsible to some extent for loss of flavour in flour, as the lengthened grinding surface speeds up fermentation in baking and the tendency to shorten the baking system serves to make bread less appetising. Most millers lay great stress on their wheat mixtures, and many a miller has been heard to say that a proportion of English or Australian wheat should always be included in a grist to ensure the "nutty" flavour so much desired. It seems fairly well established that the flavour of flour improves on slight ageing, say up to six or eight weeks, but after that the flavour deteriorates again. Very little is known of the chemical or biological changes which take place in the storage of flour, but it seems likely that certain changes do occur which have a distinct improving influence on flavour; after a certain point, however—possibly a definite concentration of some reaction product—the flavour goes off again. The main trouble which confronts both millers and bakers is the absolute vagueness of the term, and what may be a good flavour to one person may be indifferent to another. Jago once said: "When tasting bread nothing having a strong flavour should have been eaten previously, a small piece of the bread should be put in the mouth, masticated, and allowed to remain there a short time before being swallowed. The flavour should be sweet, and there must be an absence of sourness or any marked objectionable taste." This is rather vague, but is as far as anyone can go. Bakers certainly are being criticised on account of the tastelessness of bread, but it seems to us that there has been a general modification of standards, and that the decreased consumption of bread is due more to the rise in the standard of living than to any marked deterioration in its flavour.

Fumigation.

Frequent references have been made in these columns to the question of fumigation of food factories, and it is interesting to note that at last the Institute of Chemistry is taking an interest in the matter. At a meeting of the Council held in March, a letter was received from the Glasgow and West of Scotland section suggesting that the Council should represent to the authorities concerned that a certificate of clearance following the fumigation of ships should only be given by a qualified chemist. We are in agreement with this, but why restrict it to ships? The same precaution should be exercised in all fumigations where poisonous gases are employed. As we have frequently pointed out, the fumigation of flour mills and food factories is now becoming a recognised practice, but it is not so very long ago since prominent health officers and Fellows of the Institute contended vigorously that the fumigation of buildings with prussic acid was dangerous and should not be allowed. Time has shown that with careful manipulation and due care and supervision the operation is quite safe. Apart, however, from the danger to life by actual contact with the residual gas, there is the question of the adsorption or absorption of prussic acid by any foodstuffs which may be in the buildings during fumigation. Valuable research in this direction is being carried out, we understand, by the Food Manufacturers' Research Association, and, doubtless, standard methods will be adopted generally. The testing of materials for residual cyanides and of the atmosphere for dangerous quantities of hydrogen cyanide is essentially a chemist's job, and we welcome the action of the Institute in this matter, and hope that their representation to the Board of Trade will make it compulsory for certificates of clearance to be granted only by a competent and qualified chemist, not merely in ships, but in all places where poisonous gases have been used.

Sugar Confectionery: A Review of the Industry

By LIONEL ROBERTSON

The author reviews, from a thoroughly practical standpoint, the trade conditions for the past twelve months, throwing into relief the salient features and indicating present tendencies.

Attention is drawn to the amazing standard of quality attained by the cheaper grades of confectionery, and, although the better-class goods have also set a very high standard, they have been to some extent overshadowed by their cheaper contemporaries.

DURING THE last twelve months the sugar confectionery trade has passed through what is, in all probability, the worst period of depression ever experienced, and there must be few trades which have felt the effects of the worldwide economic difficulties to a greater extent. Although it is generally admitted that sweets are more a food than a luxury, yet in periods of depression they can be dispensed with more easily than other recognised foodstuffs, and consumption, therefore, falls rapidly, particularly so as the largest sweet consumers are those who are engaged in manual labour. With an unemployment roll, in this country alone, averaging over 2,600,000, and with many of those who have work being in short-time employment, it is not surprising that there is little money to be spared for sweetmeats.

The seaside trade of last year was completely ruined by bad weather, both wholesalers and retailers agreeing that it was the worst season since the war; neither can it be said that inland trade made up for this loss, for that too was considerably below standard. The winter trade opened briskly, but then fell off, and the Christmas trade was not up to expectations; neither extensive coupon trading nor improved terms for Christmas clubs could raise an appreciable extension in the demand. Considerable optimism was entertained as to the New Year prospects, but after a fair start there was a bad slump in mid-January, and this lasted over the whole Easter trade. It is generally agreed that January and February were the two worst months of the twelve. The prospects for this year are considerably brighter, and, given a good summer, there is every chance of a steady revival.

Slimming.

Few people realise to what extent the trade has suffered from the fashion for slimness which was introduced in 1929. The view that sugar—and therefore confectionery—is fattening has undoubtedly cost sweet manufacturers many thousands of pounds, and the extensive propaganda which has been introduced by individual firms has done very little to counteract it. Although there are signs that this fashion is now dying a natural death, it will mean a considerable permanent loss to the trade. Many people have lost the habit of sweet-eating and others have adopted the smoking habit instead. We are, in fact, rapidly approaching the stage where we shall rely not so much on adults but almost entirely on children, at least in the cheaper classes of goods.

Credit.

Competition has become more severe than ever, and perhaps the most insidious form lies in the granting of extended credit. With trade as a whole in its present condition, long-term credits are, to some extent, necessary; but in many cases the practice has been carried to extremes, and it is becoming increasingly more difficult to determine the degree to which one can compete against other firms in granting facilities, while still retaining one's accounts on a moderately secure basis. This state of affairs must in the long run have an adverse effect on the hitherto friendly relations existing between makers and distributors, and in the event of any further slump, might quite possibly bring about a serious crisis in the trade.

Quality and Price.

In general, makers have lately been more inclined to concentrate on increasing quality, rather than on any considerable decrease in price, and when the present quotations for general confectionery are examined it is obvious that prices cannot drop much further, and, in fact, many offers to-day would appear to approach very near to the "no-profit" line. There is, too, a very strong feeling, amounting to almost a certainty, that the recently signed sugar treaty will produce a considerable hardening of the sugar market in the very near future, in which case an entire re-organisation of price lists would be necessary. Quality, however, has been steadily improving in all branches, and, in particular, the majority of lines now retailing at two ounces a penny have attained a standard such as would have seemed quite impossible a few years ago. In fact, there is very little difference between these lines and the old fourpence per quarter goods.

In this connection, it is interesting to note that an American journal, dealing with the technical side of the confectionery trade, devotes space every month to a frank criticism of similar lines, purchased at random. The criticisms appear under a code number and the name of the manufacturer does not appear, but a composite illustration is given so that each maker can recognise his own goods. One would imagine that something of the same sort could with advantage be introduced into this country.*

* We are quite willing to give this a trial if manufacturers will send us their samples.—EDITOR.

A Battery of Twenty Vertical Mixing Machines, Working Pressure 150 lbs. per sq. Inch.

Note the drain taps and steam inlet pipes, also the back-pressure valves on the outlet pipes. No steam or water can "back-up" into any of the other pans.

(Photo. by courtesy of Messrs. H. Vincent, Ltd., Birmingham, and Messrs. Wm. Brierley, Collier and Hartley, Ltd.)

Russian Dumping.

An aspect of competition that may, in the future, have a very grave effect on the trade is the dumping into this country of confectionery manufactured in Russia, and sold here at prices which it is hard to believe can result in anything but a dead loss to the exporter. On the basis of the wages paid over here and the cost of raw materials, etc., it would be totally impossible to produce goods of the same quality at prices in any way comparable. Apart from this, very little effect from foreign goods is felt on the market, the majority of imports being purely specialised and proprietary articles.

Price Cutting.

An outstanding feature of the year has been the vast extension of the price-cutting campaign amongst retail confectioners. This affects all the large industrial centres to a greater or less extent and bids fair to become a very big problem in the near future. This price-cutting acts as a double-edged weapon, for, on the one hand, the public, though anxious at all times to purchase what appears to be a bargain, is always somewhat dubious of goods that are priced considerably below the makers' printed tickets, while, on the other hand, there is always the cry that, if A can sell goods at so much reduction, then B can surely do the same. Thus the legitimate retailer loses trade and yet the price-cutter does not gain so very much. It is a vicious circle, of which the manufacturer is the innocent victim. At present there appears to be no solution to the problem, despite considerable work on the part of organisations representing all classes of the trade.

Sugar Prices.

The sugar market throughout the year has been weak, and, until news came through of the suggested sugar treaty, there seemed no prospect of any rise at all. During the last two months, however, prices have begun to move upwards, and, while nothing violent has occurred—nor seems likely to occur—this rise is beginning to make itself felt, and, among those manufacturers who have been working on small margins, there is already talk of an increase in prices. Should sugar advance to any great extent, it is likely to produce very pronounced results in the trade, as the present production costs of two ounces a penny goods, which at the moment form a very large percentage of the output of many confectionery factories, cannot stand any appreciable rise in raw materials; so that, in the not too distant future, we may expect to see a re-introduction in large quantities of threepence a quarter lines. There is as a general rule a sufficient margin on the higher-priced branches to stand against a reasonable advance in the ingredients, and the wholesale prices can also rise considerably before the retail price need be affected.

Essential Oils.

Other raw materials have been moderately steady, but essential oils have touched depths that cannot

last for any length of time, and already these markets, too, are hardening, and are likely to continue to do so.

Boiled Sweets.

Turning to a consideration of the practical side of the trade, we find that few, if any, new types of confectionery have been introduced. Boiled sweets still appear to hold first place as favourite with the public, and, owing to their nature, they have been more affected by the slump in sugar prices than any other class of confectionery. The trade in this line is always very much complicated by the fact that, for plain boilings, practically no plant is required, and, with care, any man can turn out good fruit-drops or such-like simple refines from his back kitchen. Obviously such a man, allowing, as he does, his wages to stand for profits, can easily compete with the large manufacturers, who not only have extensive premises to keep up, but have to pay high wages as well, and are consequently very much handicapped in so far as the cheaper grades are concerned.

Satins, Butter Goods, etc.

Of course, with satins, butter goods, etc., this does not apply, as a considerable outlay is necessary if really good results are to be obtained. The popularity of these sweets can be attributed to two principal causes. In the first place their price, food plain refines being obtainable almost anywhere for twopence per quarter. Secondly, there is a very old notion—and like so many others an entirely fallacious one—that, as one can see through, say, an acid-drop, therefore it must be purer than, for example, a fondant or some such other opaque sweetmeat. Nevertheless, it is amazing that such a simple sweet should have enjoyed such an extraordinarily long run of popularity.

Toffee.

Toffee probably occupies second place in order of preference, but there are not nearly so many wrapped toffees sold now as there have been, even though there are many really good lines retailing as low as twopence and threepence per quarter pound. Slab toffee at twopence a quarter has been fairly popular, and this may account in some degree for the decline in wrapped pieces. Even here, however, the demand has been for chocolate-covered slabs, and this at twopence per quarter is a fair reflex of the quality that the public demands to-day. Caramels are still popular, but here again prices have slumped badly.

Rock.

Boiled sweets cannot be passed over without reference to lettered rock and other seaside novelties, such as rock-fruits, vegetables, etc. Lettered rock has been for many years one of the largest single lines in confectionery, but, owing to the inadvisability of storing it for any length of time, and to the exceedingly short season which it enjoys—even on the

A View of Eighty-eight Cooling Plates, with Runs of Four per Pan, giving an Output of well over 200 lbs. per Pan.

All cold-water piping is carried beneath the floor until it reaches the plates.

(By courtesy of Messrs. Wm. Brierley, Collier and Hartley, Ltd.)

South Coast very little over twelve weeks must be expected—the trade is left in the hands of a comparatively few firms who have specialised in this branch. Last year was a poor one for these lines, but there is every prospect of a good season—though a late one—for this year.

Jellies.

One of the most surprising features of the year has been the continued popularity of jellies, and it is only fair to add that there have been some remarkably fine examples on the market. Once more for an example of quality we must look at the two ounces a penny goods. As a general rule these jellies have been of very fine workmanship, and with a little more care in the manufacture and with wet crystallising, the majority would be far superior to the fourpence a quarter jellies of a few years ago. In fact, many times these same jellies have been seen in the shop window, marked up at threepence and sometimes even fourpence a quarter-pound, though the latter is certainly an optimistic attempt at profit-making. Jellies are, however, declining in favour, and our manufacturers would do well to concentrate on other lines for a time, to give the market a chance to recover somewhat.

Other Lines.

The majority of other goods have been normal, neither, as a general rule, much better nor much worse than previous years, but it has been noticeable that the better-class mixture—that retailing at, say, sixpence a quarter-pound—has not found the ready sale that it used to command.

"Cardice" in Production

A Cardice Delivery Van.

SOLID CO_2, the dry refrigerant which has a temperature of about −109° F., is now being manufactured on an extensive scale, under the name of "Cardice," by the Carbon Dioxide Company, Ltd., of Liverpool. Cardice has numerous advantages over ordinary ice—for one point it sublimes or passes direct from the solid to the gaseous state without undergoing an intermediate liquid stage as does ordinary ice—and now that it is being put on the market it should find extensive application in the food industries.

Weight for weight Cardice is far more efficient than ordinary ice, and as it is dry the packing arrangements are greatly simplified. As a transport refrigerant it is ideal.

In some trades, particularly that of the ice-cream manufacturer, the question of the expensive item of returning empties does not arise. Ice-cream can be packed in light, inexpensive, non-returnable boxes, and when accompanied by Cardice the cream will be kept in a hard condition until ready for serving. In addition to the saving in carriage, there is the reduction in overhead expenses, return empties, their maintenance, capital expenditure involved, etc. From the service state the ice-cream can be taken home by shoppers packed with a small portion of Cardice.

New Cannery Opens at Evesham

An Interior View of the New Cannery.

THE illustration shown above is of one of the departments in the very well equipped cannery which the National Canning Co., Ltd. (the proprietors of Wisbech Produce Canners, Ltd.), opened last month at Evesham.

Speaking at the luncheon which was given to celebrate the occasion, Mr. S. W. Smedley gave an indication of the type of produce it is intended to handle at the factory by saying that fruit, strawberries, loganberries were very badly needed for the Evesham factory, while with regard to asparagus he suggested that one or two of the larger growers should get together and put down as many acres as possible for canning purposes. They wanted thousands of acres, but of course that would take time. Every penny invested in growing produce for a canning industry would in very short time treble itself.

The new cannery occupies over 40,000 square feet and stands on nearly three acres of land, having a frontage of over 400 feet. All the equipment is of British manufacture.

In a normal day the three units in the factory will be capable of dealing with 35,000 cans and 10,000 bottles of fruit. Storage capacity will permit for the housing of over 6,000,000 cans and bottles and a considerable amount of fruit.

The German Chocolate Industry

By DR. ALFRED LAESSIG, HALLE

At our request the author, one of the foremost of Germany's chocolate engineers, reviews recent developments and discusses the present position of the German chocolate industry.

AT THE outset, it is interesting to compare the development of the cocoa and chocolate industry in the various manufacturing countries of the world since the time when it began to assume a position of importance during the closing ten years of the last century.

In order to form an estimate of the extent of this industry a whole series of different factors must be taken into account. At the same time, a detailed consideration of all these factors would lead us too far here, but a brief review is sufficient to provide one with the proper perspective. There is one factor, however, which furnishes a standard with which to gauge the development of the industry, and that is the imports (or manufacturing consumption) of cocoa beans. There are, of course, other important raw materials to be reckoned with, such as sugar, glucose, nuts, and dried milk. These materials, which take their place with cocoa as the leading raw materials, have, however, specialised uses, and, since they constitute extremely variable factors, yield widely varying figures. The most accurate and satisfactory method will therefore be to confine ourselves simply to those figures which represent the imports of cocoa beans into the different countries.

It has already been pointed out that the development of the cocoa and chocolate industries really began in the closing ten years of the previous century. At that time the chief countries and the amounts of cocoa beans consumed by them in manufacturing operations are given below:

France	15,240 tons
U.S.A.	13,180 ,,
England	10,960 ,,
Germany	9,940 ,,
Holland	8,590 ,,
Spain	6,480 ,,
Switzerland	2,200 ,,
Belgium	1,650 ,,
Austria-Hungary	1,090 ,,

None of the other countries of the world attained in the year 1895 a production of 1,000 tons. Since then conditions have changed enormously, and the following table gives the consumption of cocoa beans by the various countries since the year 1900.

Examination of these figures brings into prominence the relatively large production of U.S.A. and its extraordinarily rapid growth during the past thirty years. Germany comes second with a production of 76,170 tons, then England with 57,905 tons, followed closely by Holland with 51,800 tons. It will be seen that since 1895 France has fallen behind considerably in her position among the chief producing nations. Switzerland's production has fallen from 17,250 tons in 1915 to 7,160 tons in 1930.

It should be noted that the U.S.A. imports of cocoa beans do not give an exact indication of the position occupied by the manufacturing side, since considerable quantities are re-shipped to other American countries. Probably the actual quantity used in the U.S.A. is about 160,000 tons. In Europe the imports may be taken as representing the magnitude of the industry in the respective countries.

	1930.	1925.	1920.	1915.	1910.	1905.	1900.
1. U.S.A. ...	165·140	165·620	142·780	85·150	50·320	35·240	18·770
2. Germany ...	76·170	79·780	45·020	43·090	43·940	29·630	9·940
3. England ...	57·905	57·220	51·480	47·270	24·080	20·190	10·960
4. Holland ...	51·800	47·600	25·390	40·950	19·190	10·740	8·590
5. France ...	37·260	45·290	45·550	35·270	25·070	21·750	17·460
6. Spain ...	9·000	9·640	8·540	6·720	5·520	6·100	4·740
7. Canada ...	8·690	7·210	6·530	2·540	1·520	650	160
8. Czecho-Slovakia	7·560	7·660	2·430	—	—	—	—
9. Switzerland	7·160	6·870	10·480	17·250	9·890	5·220	3·580
10. Belgium ...	7·130	7·030	6·230	4·800	4·790	3·020	1·660
11. Italy ...	7·100	8·040	4·730	6·520	1·890	970	560
12. Austria ...	6·010	4·780	1·810	4·000	5·360	2·870	1·500
13. Poland ...	5·500	3·680	1·120	—	—	—	—
14. Australia ...	5·200	5·050	4·780	2·200	1·340	550	780
15. Russia ...	4·500	3·620	20	5·750	3·700	2·230	1·540
16. Argentina	4·400	3·860	2·890	1·170	1·040	750	600
17. Sweden ...	3·730	3·690	3·490	2·580	1·240	900	520
18. Denmark ...	2·960	2·100	2·850	4·670	1·600	1·130	750
19. Hungary ...	2·290	2·030	15	—	—	—	—
20. Norway ...	2·050	2·100	3·390	1·770	850	490	360
21. Philippines	1·300	1·760	3·160	680	840	600	50
22. Roumania	1·200	820	270	210	250	60	30

Germany is the most important cocoa and chocolate producing country in Europe. The consumption of these products is, per head of population, about the same as that in England. In view of the similarity between the production and consumption figures and the present position of the German cocoa and chocolate industries, it is interesting to go into the subject in further detail.

Beginning in 1895, the industry has advanced with rapid strides, from the utilisation of 9,940 tons of beans in that year to 19,240 tons only five years later; then the figure advanced to 29,630 tons in 1905 and 43,940 tons in 1910. In 1913 the amount had reached 51,590 tons. The war period brought importation to an almost complete standstill, which led to a complete closing down of the cocoa industry in 1917.

However, the imports rose again after the war, and in 1920 amounted to 43,090 tons. Five years later a maximum of 79,780 tons was reached. The explanation of this high figure is to be found in the unhealthy commercial conditions which existed during and following the inflation period. After the imports had suffered a setback in 1926, to 61,420 tons, and after the stability of consumption had been gradually restored, the imports rose again in 1928 to 75,360 tons, and were maintained until, in 1930, they had reached a figure of 76,170 tons.

At the beginning of 1931, however, a marked setback occurred. The figures for cocoa beans in Germany sank appreciably after January, and it is likely that no more than 63,000 or 65,000 tons of cocoa beans will be worked during the whole of 1931.

This regrettable state of affairs may also be attributed to the effects of general economic depression extending over the past six months, which has, of course, lowered the purchasing power of the public, and always shows itself in the most pronounced form in relation to luxury foodstuffs, such as chocolates, which are not absolutely necessary for human sustenance.

In spite of this temporary setback in the German cocoa and chocolate industries, which will probably again give place to normal consumption and production after improvement in general conditions, the economic status of these industries is still quite high and is of great significance. The import trade alone gives occupation to dozens of importers, hundreds of brokers and employees, and also to innumerable forwarding agents and their staffs. Apart from the shipping companies, the import trade also brings business to financial insurance companies, railways, and river traffic. The State itself also earns appreciable income from the import tariff (RM. 35 per 100 kg.), which for the year 1930 amounted to no less than RM. 266,000,000.

The German cocoa and chocolate industries comprise at present 180 factories using beans as a raw material, in addition to several hundred handling the cocoa pulp mass. In all these undertakings there are more than 60,000 operatives employed and a comparatively large capital invested, which would not be exaggerating to estimate at 20 million marks. The German chocolate industry consumes also considerable quantities of sugar, the latest estimate being placed at about 350,000 tons annually. The great upward bound which the chocolate industry made in the post-war period resulted in substantial orders for the German machinery manufacturers, which persisted up to about three years ago, and the same may be said with regard to auxiliary plant, equipment, and the varied assortment of packing materials, printed matter, etc.

Finally, the consumption of dried milk has become a very considerable item. Those who ought to know estimate that 800,000,000 litres of milk are consumed annually in the production of milk chocolate.

The export of cocoa and chocolate products from Germany is not an extensive one, due, on the one hand, to the loss of German colonies and, on the other, to the high tariffs which most countries have set up in post-war years to protect their own industries; but the imports of chocolate and cocoa products are also insignificant. More particularly the imports of Swiss chocolate have, within recent years, greatly fallen off, and the only large import figures to be recorded are those for Dutch cocoa powder, due to the favourable tariff relations. The decline in the imports of Swiss chocolate is an indication of the progress made by German manufacturers in post-war years. It is certainly a fact that the formerly unsurpassed excellence of the Swiss chocolate is now equalled, and probably excelled, by that of the German product.

It has also been remarked that the number of German chocolate factories handling raw beans is at the present in the neighbourhood of 180. In 1924, however, the number was 307, and of these a large number were so-called inflation undertakings—that is to say, concerns which had sprung up in the period of over-production. When the economic conditions became stabilised the majority of these undertakings speedily disappeared, and, unfortunately with them, a considerable number of old-established and quite sound firms, probably due to the increased scarcity of capital.

Still another interesting point deserves mention here—namely, the increasing tendency to invest capital abroad. Some very striking instances of this cannot be overlooked. In the first place, several large chocolate factories instituted their own branches in Germany, such as, for instance, the Swiss firm of Lindt and the Dutch firms of Bensdorp and Quatta. Considerable sensation was created when one of the largest German chocolate firms, "Sarotti," of Berlin, passed into Swedish hands (Kanold), but soon afterwards came under the control of the Swiss Nestlé's concern, which had already acquired in Switzerland the majority of the shares in the largest of the Swiss chocolate factories—those of Cailler, Gala-Peter, Kohler. But the most striking instance was that of a Czecho-Slovakian margarine and soap concern, Schicht, which a few years ago acquired the majority of the shares in the great German chocolate factories of Hauswaldt in Magdeburg, of Reichardt Werke in Wandsbek, of Gaedke A.-G. in Hamburg, and of Goldina in Bremen.

This transaction, which astonished most financial circles in Germany, led, only three years later, to a more sensational misfortune. The promoters had, after the loss of millions of marks, to withdraw from this adventure. The operations of the Reichardt, Hauswaldt, and Gaedke firms were reduced to a complete standstill and all rights and interests transferred to Stollwerck A.-G., which at that time represented the greatest chocolate concern in Germany. The complete disappearance of the three leading German chocolate firms mentioned has contributed, most probably, not a little to the general setback of the German chocolate industry during the past six months. Also the firm of Stollwerck itself gained little in the way of profit from the increase in its turnover by this absorption, but, on the other hand, experienced at first only a weakening in its own capital. In addition to this dividend misfortune in the case of one of the largest German chocolate firms, several other important German firms in the same industry have had in recent years to declare lower dividends, and some have actually experienced losses.

Progress in Flour Confectionery

By EDMUND B. BENNION, M.Sc.Tech., A.I.C.

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Despite bad trade, definite progress has been made in the industry as a whole. Keener competition is producing increased efficiency, improved methods of production, bright ideas of display and salesmanship, and, not least, the wider adoption of modern systems of costing so essential to financial stability.

Part I.—A Review of the Industry

Mixing Machines.

THE MOST noteworthy feature of the confectionery trade during the past year has been the continuance of the trend towards factory methods of production, and this has naturally proceeded coincidently with the development of equipment suitable for the new methods. An example of the effect that the growth of factory-scale production has had on plant design is to be found in the several new cake and whisking machines recently brought out. Automatic lubrication has now replaced the old type of grease cups on these machines, with a consequent saving in time and labour and elimination of the possibilities of inattention in this respect. In the Peerless machine of this type, not only has automatic lubrication been adopted, but separate operation of a clutch has been obviated by means of a specially designed gear and clutch lever combined. As a result, when the gear is changed, so the clutch is thrown out automatically before the next gear is engaged. This should make the machine able to stand a considerable amount of wear and tear without any fear of clutch trouble. The Hobart machines maintain a recognised position and several modifications have been introduced. With the Ericsson mixer a variable speed gear has been introduced so that twelve different speeds are available while the mixing is being carried on. With the Nuovamixa a variable speed is also an essential part of the machine, and coupled with this is a timing device so that the machine will cease mixing at a predetermined point. The new Artofex machine, which was introduced a year or two ago as a development of the old Artofex whisk so largely used both on the Continent and in this country for sponge-making alone, is built with both inclined and vertical planetary actions.

In all these there has been a gradual change over from the lightly built machines, which were designed for sponge-making alone, to a substantial three or four speed machine designed for heavier all-purpose work. This has been the logical development, since in smaller bakeries it is impossible to have specialised machinery for the production of different commodities. As a result machines are now available which will mix anything required from a sponge batter to an ordinary bread dough. It is of interest to note that on the Continent, where formerly only sponge batters were produced, there seems to be a gradual change to slightly heavier mixings in the larger establishments. With this the demand for heavier machines will increase, and it seems likely that the possibilities of their labour-saving qualities will be realised.

The pressure sponge whisk mentioned in another part of this journal has been used with great success for the production of sponge goods, and experiments are under consideration for a wider application of this type for more general use in confectionery. By this means it may be possible to reduce mixing times for other kinds of cake in a manner similar to that which has been done with sponges.

Oil-fired Ovens.

In large installations, more ovens have been converted to oil firing, and the writer recently had the pleasure of seeing one installation for slab-cake production in which a battery of twenty drawplates had been converted most successfully. The baking was as uniform as the best results obtainable with a travelling oven, and the batches were always ready to time.

Swiss Roll Plant.

The greatest progress in flour confectionery plant has been in the development of the Swiss roll plant (described in detail below). In this, the steel band conveyor has played an important part, and there is no doubt that it will figure still more prominently in the development of bakery ovens where continuity and productivity is all-important. These steel bands and chain conveyors are used in conjunction with high-pressure gas-fired ovens. For large-scale production they are of the horizontal type, but for smaller bakeries there are several units of the swinging tray type for the utilisation of the average baking pan. In the smaller ovens these can be discharged at the same end as they are set by one man.

Electric and Gas Ovens.

Electric ovens continue to increase in popularity wherever the power is available at a suitable price. These are used more in small bakeries than in the larger ones, and are very successful in producing uni-

formly baked products. Experiments are also being carried out for the utilisation of gas firing in ovens of the side flue type, by the use of burners which will heat up the oven so that it will bake by means of radiant heat.

For those who are doing sufficient trade a small depositor has been introduced which is useful for any kind of depositing where quantity is available.

Raw Materials.

Each year sees the introduction of new raw materials on the market which are either an improvement on those previously used or which embody modern scientific ideas in their production and utilisation. Among the *fats* available, shea-butter has attained a conspicuous position largely because of the quantity available and its low price. Shea-butter alone is not a suitable product for use in confectionery, but in its plastic form or blended with other fats it is distinctly valuable. The importance of emulsification has for some time now been recognised, but the difficulty of always having an emulsion prepared when required is one which is bound to crop up from time to time. This should now be eliminated by the marketing of Emultex, a new product which can be used in a manner similar to milk powder. This is claimed to combine the quality of milk powder with the advantages of fat, so that by its use both fat and milk can be introduced into confectionery smalls or bread. It is in reality a milk powder with a high content of vegetable fat. By the dispersion of this in water a stable emulsion is obtained.

The use of *lecithin* in confectionery has been investigated both in this country and America and Germany, and from the results obtained it seems likely that there is a field for development in this direction. It has been found an invaluable asset in chocolate because of the fluidity it imparts, and in the same way a similar fluidity obtained with cake batters may be a means of revolutionising cake-making and so producing much fine cake with exceptional keeping qualities. Such a product as lecithin mixed with sugar (which renders it more easily utilisable) is now marketed under the name of "Lecol." The percentage used is small, varying with the type of cake being produced.

Butter flavourings are always interesting to examine, but very frequently disappointing in their results. There is, however, much work being carried out on this subject, and the writer has examined a sample of butter flavour which was above the average and produced a satisfactory flavour in the finished cake.

Aerating agents are substances which have not yet been perfected, especially those of a phosphate base which not infrequently leave an unpleasant aftertaste in the mouth. There is scope for further work on these or other mixtures, so that a slow-acting, powerful aerator can be obtained which will not leave any unpleasant aftertaste. It is of interest to know that such work is being carried out.

There is an increasing trade in *marshmallow* and several new varieties have been marketed. The quality, generally, of this product is vastly improved.

Much research is being carried out on various types of *sugars* for different types of cakes, and it seems possible that interesting results will accrue. The balance of mixings and the effect on faults is one which has caused some interest in America.

Wrapping of Products.

More attention is being paid to the display and wrapping of bakery products now than formerly, and this, too, is largely due to the factory production and distribution to retailers who wish to have as pleasing a product as possible to display to the public. Further, it is necessary to pack the products well in order to minimise the quantity of damaged goods.

The public to-day are more fastidious about the type of parcel that they will carry, and so it has become increasingly necessary to pay attention to this by using suitable carriers for all types of cakes and also wrapping in transparent or wax papers other varieties which are not so perishable.

Window displays have been much better and are becoming increasingly so, due largely to the designs and craftsmanship of the shop-window fitters, who by their equipment make it so much more easy to make an effective display. The bright colours which formerly were so prominent have largely disappeared, and in place of them have come delicate tints and neater styles of decoration. In this way the decorative styles of cakes have followed progressive ideas in architecture, the ornate having been displaced by simpler, more effective styles. A wider range of products with a greater appeal is on show in many of the large shops at prices which suggest value for money.

Part II.—Modern Production of Swiss Roll

The past few years have seen many developments in the large-scale production of commodities which twenty years ago were the pride of the many housewives who specialised in the cooking of dainty cakes. One of these commodities, sold on such a scale as was never contemplated even by the greatest optimist, is the familiar "Swiss roll." As a result of the advertising which has been so successfully carried out there has been a continuous increase in the consumption of Swiss roll, a consumption which has by no means yet reached the saturation point.

In order to cater for this trade a new plant has been developed which is fully automatic. Previous plants have been produced having great outputs, but they were only semi-automatic, a considerable amount of labour being required in between the processes.

In the older method, which is now obsolete for large-scale production but still the general method for normal outputs in small bakeries, the Swiss roll was baked on special fine paper on baking sheets. The sponge batter was whisked in open whisking machines and then automatically deposited and spread on to the prepared sheets. These travelled through

a gas-fired oven, and when baked were passed over cooling racks so as to be delivered cool at the tables. Here, the sheets of sponge were turned over and the paper was removed. This involved the use of much labour and the process usually resulted in the floor becoming heavily littered with torn paper and fragments of sponge.

With the development of conveyors, and especially of the steel band type, it has been possible to carry out the complete process of making Swiss rolls, from the preparation of the sponge batter to the wrapping and boxing of the finished product, without the removal of it from the conveyor and with the minimum amount of handwork, the operation being on the "line" or "flow" principle of continuous production adopted in so many industries.

With the adoption of the steel band conveyor it has been found possible to eliminate much waste and to obtain much more hygienic production of this confection and in increasingly greater quantities. The conveyor carries the batter right through the ovens and is certainly a great forward step in baking practice, and considerable credit attaches to Baker Perkins, Ltd., and Mr. E. G. Ellis, who jointly evolved the process.

It is of interest to follow the process from start to finish and see how an endless piece of Swiss roll is obtained.

The sponge batter is produced by means of the Morton high pressure whisk, the operation being completed in this new machine in three minutes, compared with fifteen minutes on the ordinary vertical whisk machine. The value of such machines will be readily appreciated when it is realised that a continuous supply of batter is required. The batter from these machines is ejected by means of the compressed air which has assisted in the production of it, and it is then transferred to the hoppers A in Fig. 1. From these hoppers the batter is deposited on the travelling steel band.

At the commencement of the oven conveyors the bands pass underneath special burnishing machines, by means of which they are scrupulously cleaned and polished—a most necessary factor in the production of any sponge goods. To each oven there are two conveyor steel bands of approximately 62-feet centres. These are 18 inches wide and travel at a speed of 10 feet per minute. The terminal drums are 36 inches in diameter.

After being burnished the bands pass under a greasing machine, where a mixture of flour and fat is placed on them by means of special brushes designed so as to produce a continuous film.

The batter is now fed on to the band, which has been preheated, in a measured uniform layer which can be controlled and to a width of 14 to 16 inches. This forms a continuous layer which is baked in the oven for about five minutes at a temperature of from 450° to 500° F. As it emerges from the oven as a correctly baked piece of sponge it is removed from the steel band by a suitably designed mechanism attached to the terminal wheel of the conveyor. This transfers it to fabric conveyors set at a decline so as to bring the two pieces of baked sponge on to the two main steel conveyors on the lower floor. During this process the sponge is reversed so that the baked surface is underneath and the spongy face is now ready to receive the jam or cream filling. These conveyors travel in the opposite direction to the oven conveyors. During its passage along these conveyors the sponge must be cooled down to a temperature suitable for the spreading of jam or cream fillings, which have a fairly low melting-point.

In order to obtain this cooling, which is essential

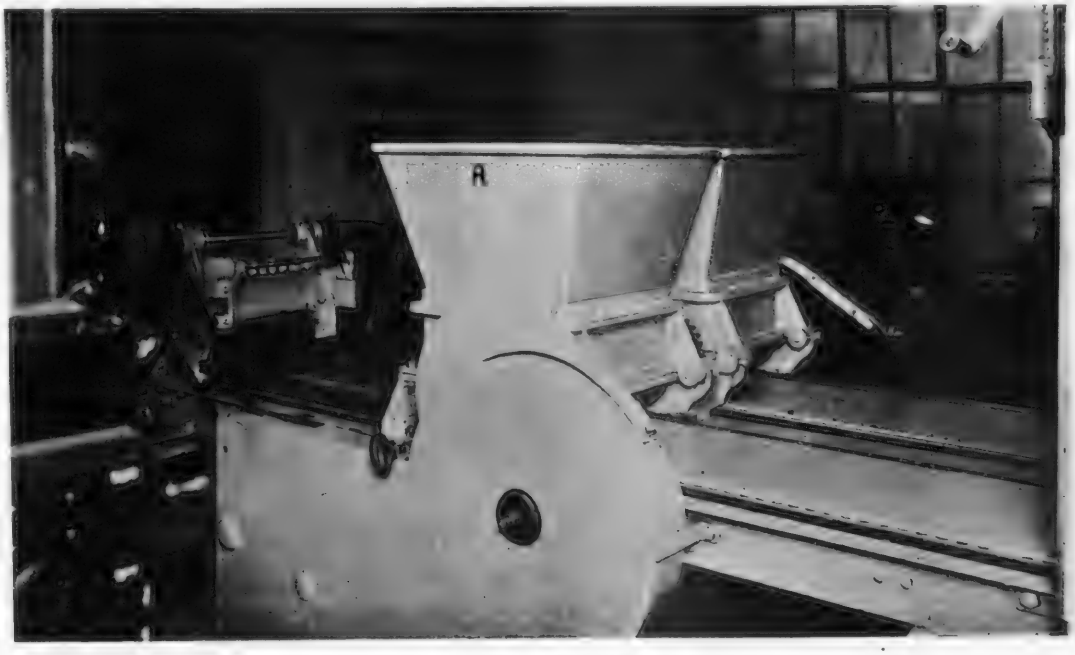


FIG. 1.

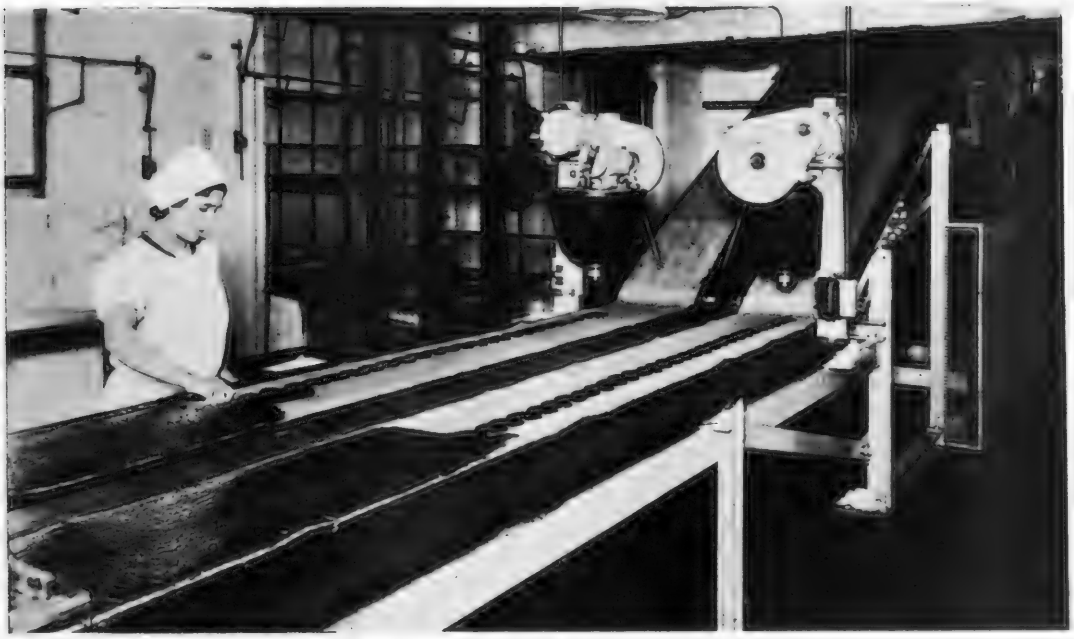


FIG. 2.

FIG. 3.

for good keeping qualities and freedom from mould, the conveyor is partially enclosed and a cooling chamber is constructed. On the efficient working of this there are two schools of thought. One considers that cooling down is the essential feature and loss of moisture is not to be considered, since the sponge should be made of such ingredients that it will have satisfactory keeping qualities, and therefore the possible loss of a small percentage of moisture, through the application of a forced draught, is not important. The second school of thought considers that the absolute minimum of moisture should be lost during this process, and so the humidity of the cooling air should be carefully controlled. This has necessitated a much more expensive plant, and practice alone will show which method is really best. From observations up to date, both Swiss rolls have good keeping qualities in the wax paper in which they are wrapped.

After cooling comes the spreading of the jam or cream. Here again there are two schools of thought, one preferring to weigh on to the jam a definite number of ounces per foot of roll, whilst the other method is to deposit the jam in a similar way to that used originally for depositing the sponge batter. Fig. 2 shows the method of weighing and spreading by hand. There is one objection against the second method, however, and that is that when a substance is being conveyed along a steel band it does not always run dead centre, so that if spreading is being carried out and the sponge is not fully spread then jam is wasted and labour must be employed to check such defects.

After the jam or filling has been spread the sponge ribbon is cut into pieces by hand operation, using a suitable gauging tool, and then the sponge is rolled into shape as shown in Fig. 3. From here by conveyor band they are transferred to an automatic machine which places the rolls in cardboard boxes, seals and wraps these boxes in wax paper, and at the same time recording the day of manufacture on them, so that in case of necessity each roll can be traced.

The daily production of such a plant is about 25,000 rolls, they have been a pronounced success and several are already operating in London and the Midlands.

The steel conveyor is also used for baking small sponge cakes and sponge sandwiches, and with its introduction into the bakery a most hygienic method of handling, free from all risk of taint, rancidity, contamination, or spoliation by rough handling, has been made available.

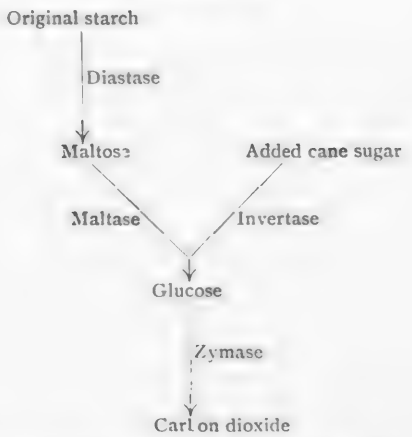
Enzymes in the Baking Process

WHEATEN FLOUR is the seat of much enzymic activity, and many of the changes which take place in wheat during conditioning, and in flour during storage and baking, are influenced by enzymes. Enzymes in wheat and flour have been recognised for many years. It was in 1879 that Brown and Heron noticed that during the germination of wheat the cellulose cell walls and the cellulose of the starch granules were broken down. Brown and Morris also found that the parenchymatous cell walls of the endosperm were gradually dissolved by the enzyme cytase, which is secreted by the embryo during germination. This is a most important point in malting as well as baking, since it is due to the activities of cytase that the starch is liberated to be attacked by other enzymes such as diastase to form sugars.

The chief enzymes which function in flour-milling and bread-making are cytase which attacks cellulose, diastase which converts starch into sugar, protease which converts proteins into peptones, and zymase which is present in yeast along with invertase and maltase. The changes which occur may be represented as shown in diagram in next column.

It is thus seen that to obtain the carbon dioxide gas necessary for the aeration of a dough it is essential to have the various enzymes functioning properly. Zymase cannot attack starch. The starch must first of all be converted into a six-carbon sugar, and also any added cane sugar must be inverted before it can be assimilated by the zymase.

It can readily be understood that the most important enzyme is diastase, because this is the one which saccharifies the starch. Diastase is present to a greater or less degree in all varieties of wheat, but it must be made to function properly. Rumsey stated that "the flour showing the greater diastatic power should show the greater baking strength and consequently the greater baking value, providing the relative quality and quantity of the gluten is the same." There are various ways of improving the diastatic power of flour. It was found that the baking strength of flour milled from wheat low in diastatic activity was increased when 3 per cent. of sprouted kernels was added to the wheat. The increased



strength was registered in terms of a decidedly increased gas production, a small increase in gas retention, increased loaf volume, and superior grain and texture. Time for proofing was reduced, and the colour of the crumb appeared whiter and the crust of the loaves was browner and more pleasing in appearance when the mixture contained germinated wheat. So far as could be detected, protease activity was not increased and the protein strength was apparently unaffected.

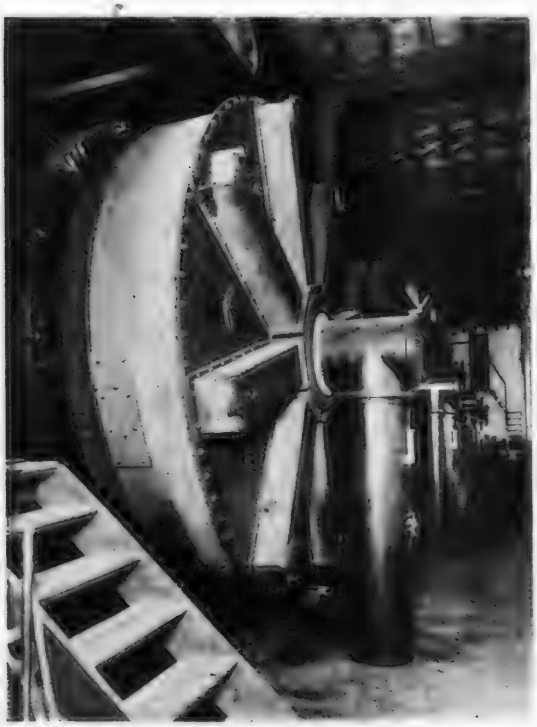


FIG. 1.—End View of a Series of Germinating Drums used as an alternative to Floors for Malting Barley.

It is well known that some wheat-growing areas yield superior wheats to other areas from the bread-making point of view. Some of these are due to differences in protein content and character, brought about by soil conditions and manurial treatment, but there are other wheats rich in protein and with a good gluten which do not give a good loaf. As Bailey has pointed out, this is probably due to the lack of starch-splitting enzymes. Mangels found that low diastatic activity could be associated with low rainfall. Ceres wheat produced on rotation and fertility plots showed variation in diastatic activity due to different cropping systems and fertilisers. He concluded, however, that the variation in diastatic power was due in large part to the susceptibility of the starch granules to diastase attack rather than to the concentration of diastase present. Interesting work done in Germany indicates that the diastatic activity varies in the different millstreams, being less in the most refined flour (*Auszugmehl*) than in the low grades (*Nachmehl*).

Diastase has a definite influence on crust colour. The average consumer requires a loaf very white in crumb and golden brown in crust. Bakers have long known that the addition of sugar improves crust colour. Blish and Sandstedt went so far as to suggest that, provided all ingredients and environmental factors of the baking test are fixed, comparative crust colours serve as a reliable index to the relative diastatic powers of the flours.

The improvement brought about by the addition of germinated wheat is obviously due to the increased diastase present in the sprouted grain, and this amounts to the same thing as adding a malt extract with a suitable diastatic power. Malt extract is indeed preferable, for in addition to providing more diastase it also contains valuable yeast foods, in the shape of inorganic phosphates and nitrogenous matter, chiefly as amino acids, obtained by the degradation of the protein by the peptase and tryptase of the bran. In the milling of white flour these valuable enzymes are removed and consequently the yeast is deprived of some of its food supply and does not work so energetically. This is corrected by adding malt extract.

This is a convenient point to give brief consideration to the methods employed in the manufacture of diastatic malt extract. After steeping in water the barley is spread out on floors to germinate, or, during the warmer months of the year, malting is carried out in slowly revolving drums (see Fig. 1) through which clean air is forced (the vertical supply ducts are seen in the illustration and are connected beneath the floor to a common main which brings the air from a wash-tower). When germination has arrived at the correct stage, it is arrested by drying the grain in specially constructed kilns. It is then cleaned to remove the rootlets, granulated, and the husks separated. The granulated material is stirred with warm water in mash-tuns to remove the soluble portions and the aqueous extract is reduced to a syrup in vacuum evaporators, giving various grades of malt extract. To prepare dry malt extract the syrup is fed on to a series of perforated, superimposed travelling bands in a steam-jacketed vacuum dryer (see Fig. 2), from which it emerges as a pale to golden brown powder, which, being hygroscopic, must be stored in a dry place. This form of malt extract has obvious advantages and appears to be gaining favour rapidly. Another preparation preferred by some bakers is malt flour. Malt extracts are of complex composition and contain maltose, dextrose, dextrine, proteins, mineral salts, water, diastase, peptase, tryptase, and cytase.

Proteolytic Enzymes.

Ballard in 1884 reported the presence of a protein-splitting enzyme in sprouted wheat flour and bran. He studied the effect of prolonged standing on the washing out of the gluten, and found that the longer the dough was allowed to stand before washing out the gluten, the less gluten there was washed out. It was later found that a flour extract would liquefy gelatin, a sure evidence of the presence of a proteolytic enzyme. Collatz found that the proteolytic enzymes of malt flour acted on the glutenin, and as Sharp and Gortner found that glutenin is the protein responsible for the increased hydration capacity produced by acids, there may be some con-

nection between hydration capacity and proteolytic activity.

Other Enzymes in Flour.

The brownish colour of some breads has been attributed to the activities of an oxidising enzyme similar to tyrosinase which is present in the bran. Another enzyme is catalase, which is concerned with oxygen transfers and destroys the harmful peroxide found in living cells. Catalase activity has been advocated as an index of flour grade instead of the Pekar test. It was found that there is a regular increase in catalase from the high to the low grade flours, and by measuring the volume of oxygen liberated in one hour from 10 c.c. of 12 per cent. hydrogen peroxide in 100 c.c. of water, by 25 grams of flour, a useful index of flour grade is obtained. Quite recently Bunzell and Forbes have used the enzyme catalase as a means of testing for rope in bread. It is based on the proved fact that as rope organisms develop in bread the catalase activity increases proportionally. The unit of infection is defined as that degree of infection which will cause liberation in five minutes of 1 microgram of oxygen per gram of bread which has been incubated at 50° C. for twenty-four hours.

Some very interesting work has recently been reported by Pascoe, Gortner, and Sherwood, who have examined the properties of a series of commercial and experimental flours milled from the same wheats. They have found that the saccharogenic activity of flour milled in the experimental mill does not truly represent the potential activity of commercially milled flour from the same wheat, and in some cases the saccharogenic activity was four times as much in the commercially milled flour. This leads to the very interesting conclusion that the degree of granulation of flours is an important factor in the consideration of the saccharogenic properties. Thus a sample of flour on being ground for twenty hours in a ball mill showed an increase of 35 per cent. in its saccharogenic activity. This does not mean that fine grinding produces diastase, the probable explanation is that the cells become more open to attack by the diastase present.

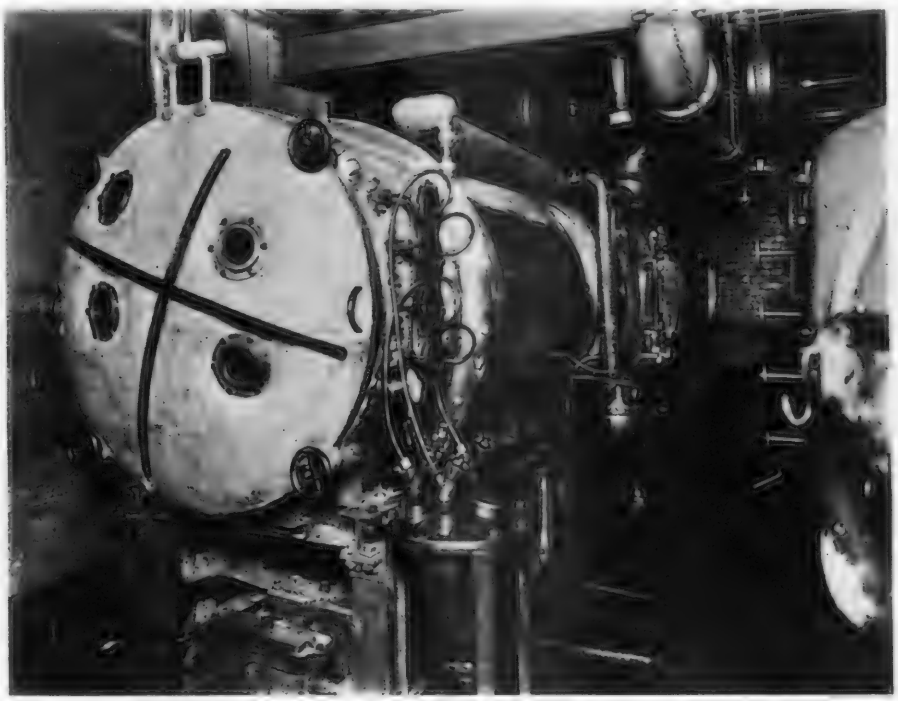


FIG. 2.—Continuous Vacuum Dryer for Drying Malt Extract to Powder Form.

The Action of Diastase in Baking.

When a mixture of starch and water is heated slowly a change takes place round about 65° C.; the milky liquid clarifies owing to the gelatinisation of the starch and the rupture of the starch granules. In bread-making the same sort of thing occurs. The starch in bread is mainly gelatinised—if not it would be indigestible, as the digestive juices could not attack it. The functions of the enzymes can be clearly differentiated; thus, one opens up the granule and makes the starch soluble, another converts the soluble starch thus formed into dextrine and maltose, which is later converted to glucose. In a dough the diastase has to work on the starch in its natural state, so that in estimating diastatic activity raw starch should be used—not soluble starch, where part of the work of the diastase has already been accomplished.

Variation in Diastatic Activities.

As has been pointed out, different flours vary considerably in their diastatic power, and the question arises, "Which is the correct diastatic activity?" A too low diastatic activity results in a quick consumption of maltose by yeast and an insufficient replacement of the sugar. Hence the fermentation proceeds very slowly, particularly in the latter stages of proofing. The bread produced will be very pale and unappetising. If, however, there is a too high diastastic activity equally unfavourable results are obtained. The gassing may be satisfactory and the crust of a good colour, but the crumb will be soft and sticky owing to an excess of dextrines. The crust colour will develop too rapidly, and its appearance may lead the baker to take out the bread before it is finished, and the crumb will be sticky. If the diastatic activity is too high it is also likely that other enzymes which break down gluten will also be in excess, and the gluten will be weakened and made less elastic. It is evident, therefore, that an extremely high diastatic activity is not desirable.

It is not possible to be dogmatic and say that a flour should have this or that diastatic activity, because so much depends on the baking technique. When malt extract or flour or sugar is added a low activity does not matter much, which is also the case where leaven is employed, as in an acid medium the enzymes work much more rapidly. But in cases where the fermentation takes place with the consumption of sugar without any external replacement, then a high diastatic activity is essential. This applies specially to the long fermentation process, where large quantities of yeast are used and when the temperature during fermentation is high.

According to the Novadel Laboratories, when the baking is carried out as follows: 2 per cent. yeast, 2 per cent. salt (calculated on the flour), dough temperature 25° to 28° C. with a first fermentation of one and a half hours followed by a proof of about three-quarters of an hour, the optimum diastatic activity lies between 90 and 140 as determined by their method.

If it is found that a flour has not the correct diastatic activity, what steps should be taken to put the matter right? If the diastatic activity is too high three factors may be involved, (*a*) wheat blend, (*b*) milling, (*c*) baking. In the first case there may be sprouted berries in the mixture. These should be traced, and the group responsible removed or reduced. On the milling side a too fine granulation should be avoided, as very fine grinding tends to increase diastatic activity. On the baking side care should be taken to avoid adding too much malt. Many a miller has gone to infinite trouble to trace the cause of bread made from his flour browning too rapidly and giving a sticky crumb, when all the time the fault has been the baker's in using too much malt extract. When malt extract is added to a flour it should only be done when the low diastatic activity as determined chemically demands it, and then only in such amounts as the determination indicates.

If, on the other hand, the flour is lacking in diastatic activity no alteration of milling technique can improve it. It is purely a matter of wheat blend or addition of malt extract in baking. The addition of a No. 5 Manitoba or damp English slightly germinated will often correct a deficiency in diastatic activity. In the bakery the judicious addition of a calculated quantity of malt extract will improve the gassing properties of a flour poor in this respect.

The enzymes involved in baking practice may be summarised:

1. *Cellulolytic*, which dissolve the cellulose tissue, *e.g.*, cytase.
2. *Amylolytic*, which saccharify starch, *e.g.*, diastase.
3. *Proteolytic*, which convert insoluble proteins into soluble peptones, *e.g.*, protease.
4. *Inversive*, which invert cane sugar such as invertase.
5. *Maltase*, which converts maltose into glucose.
6. *Zymase*, which converts glucose into carbon dioxide.

We are indebted to the British Dia Malt Company for their courtesy in showing us through every department of their interesting works, for placing their knowledge most generously at our disposal, and for supplying the two photographs shown above.

A View of the Stand which FOOD MANUFACTURE shared with its Associated Journals, THE MANUFACTURING CHEMIST and PAINT MANUFACTURE, at the British Chemical Plant Exhibition last month.

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Improvements in the Preparation of Cacao Beans

I.—Plantation Practice.

For many years the German journal "The Gordian," which is devoted to the chocolate industry, has been crying out against what it stigmatises as the slipshod, antiquated and hopelessly inefficient methods adopted on overseas plantations, and has been pleading for an improvement in the quality of cacao beans, which it contends is possible of attainment, by the introduction of more scientific and rational methods. In spite of much moaning and "gnashing of teeth," neither "The Gordian" nor anyone else has put forward any tangible suggestions as to how these improvements are to be effected. When, therefore, Dr. Alfred Laessig (whose review of the German cocoa and chocolate industries appears on another page) supplied, at our request, a description of a new system of preparation of cacao beans, we realised that this, the first published account of the Laessig system, would be read with great interest by planters and manufacturers in all parts of the world.

The system advocated for the preparation of cacao beans on the plantation involves a washing process (following the usual fermentation) and then a drying process carried out in a plant of special design.

The principal claim for the system is that of effecting an improvement in quality. It is contended that the beans at present received for chocolate manufacture are definitely inferior in quality compared with what they might easily be were more care taken in their preparation and more consideration bestowed upon the details of this preliminary treatment in relation to the particular uses to which the product will be put. Moreover, no effort appears to be made to profit by the knowledge made available by modern science nor the mechanical appliances offered by those skilled in engineering.

In order to render freshly picked beans storable, the embryo must be destroyed and, after conversion into an edible product by oxidation and alcoholic fermentation, the beans have to be dried in such a manner that the enzymes are preserved, as these are responsible for the development of the cocoa aroma. The oxidation of the beans arising out of the fermentation of the pulp, accompanied by changes of the glucosides and tannins and of the colour (to brown) and taste, is continued during the drying process, and, apart from a rational application of the fermenting and washing processes, it is of first importance to see that this drying is carried out in a proper manner and in suitable apparatus. Hitherto the washing and drying processes have been utterly neglected, even on large, well-managed plantations.

Nothing is to be said against the customary method of fermentation and no particular improvement is suggested, provided that the fermenting material is moved at properly timed intervals and the process is carried out to the correct stage.

There are many objections to be raised, however, to the faulty and inadequate methods adopted in most plantations for cleaning fermented cacao beans and to the practice of the subsequent drying of these beans without troubling to clean them of the adhering fermentation mucilage, often including some pulp refuse, which clogs the pores of the shell—thus handicapping drying. The same may be said of the drying methods and plant in vogue, which are of a faulty and unscientific character.

To remedy this deplorable state of affairs, plant of an entirely novel design has been constructed by the German firm of Wilh. Jaeger for carrying out the washing process efficiently. Also this plant introduces two new functions: (1) An acceleration of the oxidation process by means of thorough aeration, and (2) A preliminary drying of the beans, by means of which the final drying operation is considerably relieved and shortened.

The main part of the washing machine consists of an iron tank, the upper part cylindrical and the lower part conical. The latter terminates in a valve fitted with a grating, from which the water and, subsequently, the beans contained in the tank may be quickly discharged. Three sizes are built—viz., approximately 140, 280, and 875 cu. ft. respectively. In the centre of the tank is a large pipe and arranged concentrically are four smaller pipes. Compressed air is blown through these pipes, which has the effect of throwing the water and the beans into continuous circulation. Thus the beans are gently but thoroughly washed and cleansed by mutual friction. The dirt is driven to the surface and removed through the discharge.

On completion of the washing process, which for highly polluted beans should occupy a maximum of fifteen minutes, the water is drained away and the central pipe connected to a powerful exhauster and air drawn through the beans to affect the preliminary drying. Then the beans are discharged and fed into the dryer proper.

The results of this washing process may be stated as follows. Oxidation is considerably promoted; the beans being properly cleansed, have their pores opened and freed from extraneous matter, thus permitting the free penetration of oxygen and enhancing the flavour and aroma of the beans.

Some figures of moisture contents for Venezuela beans may be of interest.

Weight of beans removed from pods ...	321	kg.
Weight after fermentation	295	,,
Weight after washing	280	,,
Weight after aeration and pre-drying ...	196	,,
Weight after final drying	119	,,

Thus the washed beans contained 161 kg. of moisture, or 57 per cent. After aeration they contained only 77 kg., or 27 per cent. of moisture.

The best method of cacao-drying has been that of sun-drying on floors at a temperature between 35° and 40° C. (95°–105° F.). This method, however, entails too great a dependence on the weather, which in the tropics is notably erratic. One tropical downpour may destroy or spoil the work of days. To provide against these contingencies some planters have introduced movable roofs or drying floors. This method is, however, not entirely satisfactory, which accounts for the fact that many planters, especially in South America, have adopted artificial means of drying.

In drying houses the beans are usually spread out on grids which are heated by hot air arising from pipes below, which in their turn are heated by the products of combustion supplied by some form of stove or furnace. This method has the disadvantage that the cocoa frequently acquires a smoky taste or smell and that the heating is not uniform.

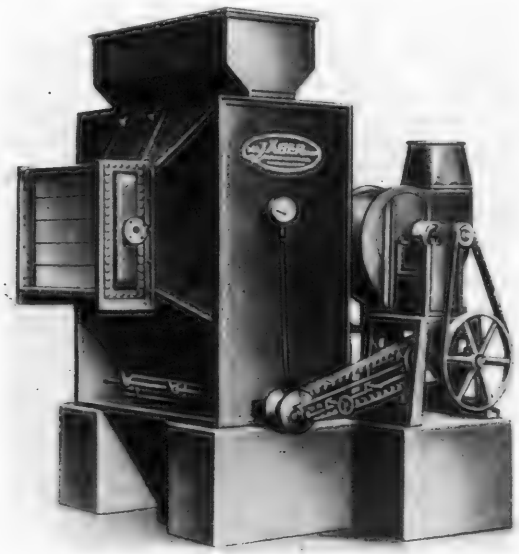
Other forms of drying machines employed on plantations are also defective in that they cannot be controlled to the nicety requisite in the drying of so sensitive a material as freshly fermented cacao beans. Especially, in this respect, do they tempt the planter to dry at too high a temperature. It should be remembered that the structure of the protoplasm of the bean is destroyed at 72° C. and that of the cacao enzymes at 75° C. Thus drying at a higher temperature has an adverse effect on the quality, flavour, and aroma of the beans, and one may cite the depreciating quality of the Bahia cocoas as an example.

These, and other considerations involving questions of throughput, thermal efficiency, etc., have led to the design of a new type of dryer, the so-called "Wilha" dryer, illustrated here. This dryer is made of steel and can be easily and quickly erected at the site. Special foundations are usually not required.

The cacao beans, previously washed, aerated, and pre-dried as described above, are fed into the dryer, preferably by

some form of conveyor. The principle upon which the dryer works is made obvious by examination of the sectional drawings figured here. The beans descend at a regulated rate a narrow, louvred drying chamber, and through this stream is passed warm air at controlled temperature, humidity, and volume. The same principle has been used for many years in the drying of grain. Thus the beans are continually kept in motion and are turned over and over, and experience uniform drying conditions. On completion of the drying process the beans are cooled at the lower part of the apparatus and then discharged.

Drying carried out in this manner ensures preservation of the aroma-determining enzymes; the beans are delicately handled, and they are dried uniformly and thoroughly. Moreover, the shells are effectively loosened.



The Wilha Dryer.

Tests show that the throughput is about 315 kg. with beans of 28 per cent. moisture content, or 2,500 kg. for an eight hours' working day.

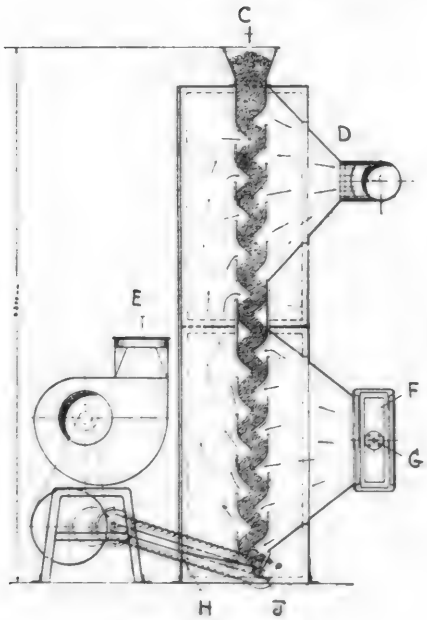
II.—Factory Practice.

The following is a brief account of Dr. Laessig's arguments in favour of introducing washing and drying processes and, in certain cases, an "after-fermentation" process, and also the elimination of the roasting process, as part of the treatment of cacao beans in cocoa and chocolate factories—as distinct from plantation practice, which has already been dealt with above.

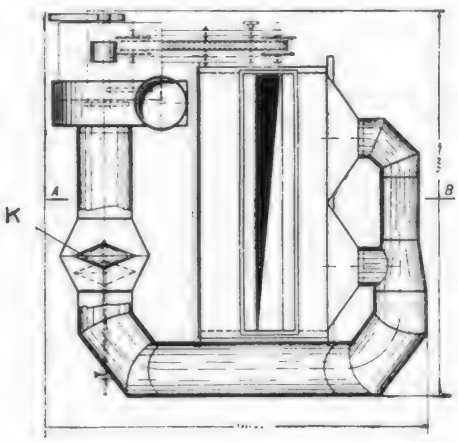
It is contended that the traditional method of subjecting uncleaned or incompletely dried cacao beans to drastic roasting in revolving and heated cylindrical roasters is bad practice, mainly by reason of the fact that the dirt and desiccated products of fermentation with which the shells are covered become carbonised in the course of the roasting process and give off objectionable vapours which usually prevent the finest aroma being developed in the cocoa. It is claimed that the Laessig process has the advantage of being a wet-cleaning process, employing warm water in a suitable apparatus.

This washing process is stated to introduce a further advantage in the subsequent treatment of the beans—namely, an easier separation of the shell from the nib in the cracking and winnowing machines. The old system whereby this was generally effected by roasting at relatively high temperatures led to the destruction of the cacao enzymes, which are the most valuable constituents in that it is to them that the cocoa owes its aroma. On the other hand, a properly carried-out washing process introduces through the pores of the shell into the junction between this and the nib sufficient moisture to enable moderate drying to detach the former quite easily from the latter. The result is that a cleaner and more economical separation can be effected in the winnower, which is conducive to increased purity in the cocoa mass.

It is claimed for the so-called "after-fermentation" process that cacao beans which, owing to being picked before they are ripe or because they have not been completely fermented on the plantation, arrive on the market with a blue or violet instead of a brown colour and with a sour



Section A-B



PLAN.

The Wilha Dryer for Cacao Bean.

C.—Feed end of drying chamber.
D.—Removal by suction of warm air used for drying.
E.—Air discharge.
F.—Air heater.
G.—Steam supply.
H.—Regulator for speed at which beans pass through dryer.
J.—Discharge of dried material.

Output per hour = 500 kg. with 6 per cent. moisture. / 300 kg. with 30 per cent. moisture.

Power consumption = 4 h.p.

Steam consumption = 200 kg. per hour.

and harsh instead of an aromatic and mild taste, can be appreciably improved in quality as a result of stimulation of the dormant fermentative action by application of the "after-fermentation" process.

The third feature of the system—namely, substitution of the old rotating roasters in which the beans were agitated at relatively high temperatures by a drying arrangement which permits the beans to descend gently a drying apparatus at a much lower and properly controlled temperature—avoids destruction of the enzymes. It has been scientifically established that the latter are destroyed at the temperatures employed in roasters and with them the possibility of any further development of aroma.

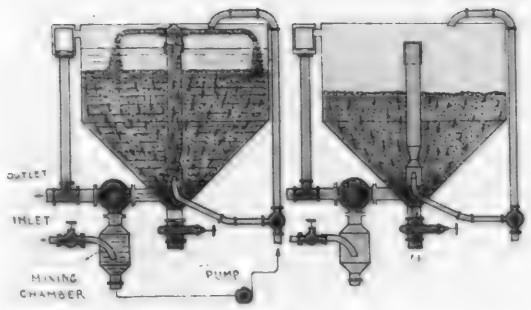
It is held that the employment of this system enables the manufacturer to produce, without increase in labour and other working costs, an appreciably purer, more palatable and more aromatic cocoa mass than by the old method. The "after-fermentation" is also said to permit of the production of better qualities of cocoa from cheap grades of raw material.

The resistance which these ideas encountered in the industry is stated to be partly due to the lack of really suitable plant for putting them into practice. Now it is claimed that this has been remedied.

The dryer is based upon the principle of the "Rieseltrockner," which has been employed for many years in the drying of grain by the circulation of warm air through the material slowly descending the narrow, vertical and louvred drying chamber. Both this and the washing plant are made by Wilh. Jaeger.

The following samples were submitted to one of the leading Hamburg importers without indication of origin:

A quite inferior Accra cocoa (21 shillings), the refined product made therefrom by after-fermentation; a quite ordinary Carupano-Venezuela cocoa (55 shillings), and the refined cocoa from the latter. The expert adjudged the improved Accra cocoa to be a superior Bahia cocoa (25 shillings), and the improved Carupano-Venezuela to be a first quality Puerto-Cabello (75 shillings).



The Wilha Washer.

It is claimed that such increases in the value of various cocoa grades are actually realisable in large-scale manufacture. According to one of the largest chocolate concerns which adopted the new system in September, 1930, it was possible to adapt their recipes to cheaper grades of beans and yet, without any increase in working costs, to turn out improved products. All harshness and sharpness of flavour had disappeared from their cocoa mass, and the flavour of their chocolates was more rounded and distinctly more aromatic. An especial improvement was said to be noted in their cocoa powder, which had acquired the fiery dark brown colour so popular with the consumer.

Book Reviews

Index to the Literature of Food Investigation. Vol. 3, No. 1, March, 1931. Dept. Sci. and Ind. Res., Compiled by A. E. Glennie, B.Sc. H.M. Stationery Office. Price 2s. net.

This extremely valuable half-yearly publication is increasing in size. The present issue comprises 167 pages and covers most of the literature relating to foodstuffs, particularly on the more scientific side.

We would make one criticism. The arrangement of the matter might with great advantage be improved so as to facilitate reference. More space should be allowed between the various sub-divisions (*a*), (*b*), (*c*), etc., of the sections, and the titles of these sub-divisions should be printed in heavier type so as to catch the eye when rapidly turning over the pages. They could, also with advantage, be centred, or, perhaps better, placed in the outer margins.

The titles of the sections themselves are ridiculously insignificant and retiring, and should in each case appear at the head of a right-hand page.

A subject index would make the publication ever so much more handy.

Finally, the matter is excellent and the work has been well done by Miss Glennie, but this matter should be rearranged in such a manner as to render it more readily available, thus enabling reference to be made to any particular subject in the minimum time, with the least amount of trouble, and with a greater feeling of certainty that nothing has been overlooked.

H. B. C.

Wheat Studies of the Food Research Institute. Vol. VII., No. 2, December, 1930. 96 pp. $2.

The wheat studies of the Stanford University, California, are always interesting and useful, and the present volume is very much so. It deals with the World Wheat Situation, 1929-1930, and is a review of the crop year. This was an amazing year in many respects. Wheat consumption in the year fell only a little below its line of post-war trend. The world wheat crop of 1929 was small, and stocks had to be reduced in the course of the year. The stage, therefore, was set for fairly high prices and firm markets, and yet wheat prices fell from a moderately high level when the year opened to the lowest level of post-war years at its close, despite the stabilising operations of the Federal Farm Board in the United States. The factors which brought about this state of affairs are discussed fully and lucidly in the studies under review. In the opinion of the compilers of this comprehensive report, the weakness in wheat prices was brought about by a combination of factors, such as extremely heavy inward carryovers, the geographical distribution of these carryovers and of the wheat crop of 1929, and a general weakening of the disposition of traders to hold stocks. In addition, European import requirements were extremely small on account of a big inward carryover, a large domestic wheat crop, ample supplies of wheat substitutes, and governmental measures tending to restrict imports. International trade in wheat and flour was the smallest in post-war years, principally because France, Italy, and Germany needed so little wheat. The review deals, in addition, with the effects of the price supporting measures sponsored by the Federal Farm Board, and how the Canadian Wheat Pool affected wheat prices and Canada's export trade. The interesting subject of the effects of increased tariffs and the strengthening of milling regulations on the imports of Germany and France receives impartial attention.

The book is of value to all those interested in the economics of agriculture as well as merely the students of the wheat situation. In the text are given thirty-eight charts which illustrate very graphically the world position and there is an appendix of thirty-five tables of statistics.

Transparent Wrappings

The Modern Packaging Material

TRANSPARENT PAPERS have been very rapidly developed as a packaging material during the last few years. Primarily, this advance has been due to the "appearance-value" of such wrappings, which, while they preserve their contents from contamination by dust, dirt, and handling, quite as well as any opaque paper, enabled the wrapped article to be seen perfectly clearly. In fact, they provide the packer of any product, especially of confectionery or foodstuffs, with the equivalent of a clear glass display jar at a fraction of the cost and risk of breakage.

These wrappings were first most extensively employed by the pharmaceutical industry; a cellulose wrapping round a bottle of perfumery, for instance, allowed it to be seen and examined quite readily, but protected it from dust and dirt, soiling by handling, etc., and also helped to prevent any escape of the aroma of the product.

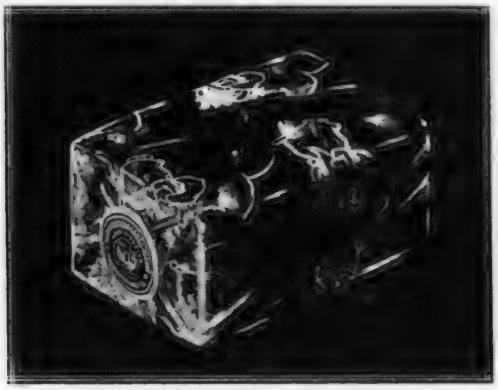
From the chemist's shop to the grocer's or confectioner's, however, is only a short step, and for some time now the food industries have employed transparent wrappings of various types extensively. Their use in wrapping chocolate boxes naturally suggested them as a wrap for bar or slab goods, and the dried fruit industry early found them useful as a means of helping the sale of raisins, nuts, etc., as a sweetmeat. Other dried fruits—prunes, apricots, currants, etc.—are now being packed in increasing volume in cellulose wrappings.

The meat industry has also taken to the use of transparencies; sliced bacon was practically the first material to be so packed, but now sausages, hams, and smoked meats are also marketed in "cellophane" type wrappings. In this country some experiments have been carried out by a Liverpool firm with the hard freezing of fish and small joints in order to preserve for a long period their original freshness. Here, again, cellulose wrappings were

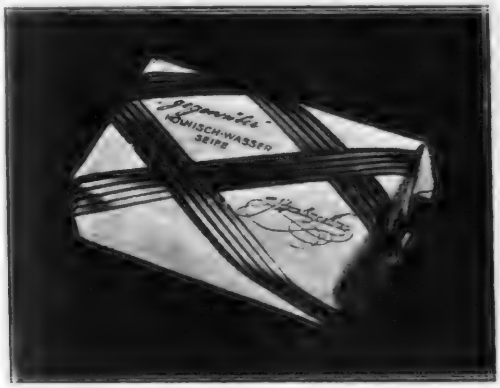
A "Cellophane"-wrapped Display.

found to be most suitable. Meat and similar substances are bought mainly on their appearance, and it is the valuable transparency of these wrappings that has rendered their use for this purpose practicable.

Fish, of course, are especially suited for wrapping in cellulose. It is essential for such a tradesman as an ordinary grocer that if he sells any fish at all it shall be in an entirely separate part of the shop, in order that the characteristic odour of the fish shall not spread to his other stock. But such fish as haddocks or kippers, for example, when protected with these wrappings may be laid on the same counter with bread, cheese, or bacon without tainting them in the least, and at the same time the full flavour of the fish is conserved.



Transparit can be used either as the wrapper itself, or—



—as an outer covering for boxes.

Biscuits, cakes, and puddings are among the latest products to be wrapped in transparent wrappings, and readers will remember seeing some interesting illustrations of such packages in the February issue of Food Manufacture. More recent still is the use of cellulose wrappings to replace animal gut casings in sausage manufacture. Although edible, cellulose is indigestible, so the wrapping is removed before consumption. A fine attractive glaze is imparted to the meat after the wrapping has been removed, however, and the advantages of the new method from the hygienic standpoint are obvious.

A good idea of the varied products in connection with which transparent wrappings are employed, and of the added attraction lent by their use, is given by the adjacent illustrations of "Cellophane," "Pliaphane," and "Transparit" wrapped goods.

For the packing of more than usually "sticky" or water-absorbing sweets such as sugar sweets, jubes, sugared almonds, or kindred articles, a special type of transparent wrapping has been introduced by Messrs. W. S. Muir and Co., Ltd. Known as "Sidac Waterproof," it completely replaces the need for any secondary lining of waxed paper, etc., and it has also been awarded the certificate of the Institute of Hygiene, which has been held for some time by ordinary Sidac.

Messrs. Courtauld's, Ltd., who are, of course, widely known as artificial silk manufacturers, are also the producers of a transparent cellulose wrapping medium known as "Viscacelle," of which we hope to give an extended description in a later issue. It is air, grease, and odour proof, and is available in sheets, bags, envelopes, and cut pieces, either plain or printed.

It would almost be impossible to list categorically every article which is now being packed in these transparencies, and as more manufacturers become aware of the advantages of the material, the list is bound to lengthen. On the consumer's side, besides the hygienic value, the natural desire to "see what you buy" is fulfilled; on the manufacturer's part there is the satisfaction of having a much more attractive, "sales-aiding" (and therefore efficient) package, which, at the same time, is as resistant to counter or shop soiling as could be desired.

A Display of "Pliaphane"-wrapped Goods.

(By courtesy of Langheck and Co., Ltd.)

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers. **N.B.—Enquirers are requested to use the special form which will be found in the advertisement pages of the journal.**

305. *Names of manufacturers of machines for making beef cubes required.* (London.)

Recommendations made.

306. *We should be much obliged if you would direct us to the maker of ice-cream cone-making machinery, as we desire to have a few of these machines in use in China. We do not want large automatic machines, but simply small machines—say, making six to ten cones at one time by gas as fuel. Please request the makers to send us detailed catalogue and export prices.* (Hong Kong.)

This was done.

307. *Information required concerning the uses, etc., of banana flour.* (Trinidad.)

A forthcoming article in FOOD MANUFACTURE will deal with this.

308. *We shall be obliged if you can let us have a recipe for white glaze for cooked meats.* (Shropshire.)

One suggestion is as follows:

Clear white gelatine	25 parts	
Farina or cornflour	25 ,,	
Water	50 ,,	(approx.)
Salt	2 ,,	(approx.)

The gelatine is soaked in water for about an hour and dissolved in its own absorbed water.

The farina or cornflour is mixed with the necessary amount of water to make a thin cream and added to the gelatine solution along with the salt and enough water to make the required weight.

The mixture is kept hot till incorporation is complete, and rubbed through a fine hair sieve and cooled to the required temperature for dipping.

Another formula is the following:

Use 2½ ozs. of "Unix" White Glaze Compound (John Crampton and Co., Ltd.) to ½ pint of water and ½ pint of milk mixed. Bring to nearly boiling-point and then add "Unix," stirring well for about five minutes until dissolved. Cool off slightly. Pour on to galantines, briskets, etc., in the usual way and leave to set.

309. *A request for the address of the Antelope Company, who issued a booklet reviewed in the Trade News section of the November, 1930, issue.* (New York.)

Address supplied.

310. *Please let me know in what English towns the rice industry is located. By the rice industry I mean the transformation of paddy and cargo into edible rice.* (France.)

No paddy or cargo rice is received into this country for treatment. The bulk of the work is done in the East, the only European countries having a small share being Italy, Spain and Greece. Even the milling of semi-milled rice is a dead industry in England, most of it being done in Holland and Germany.

311. *In* FOOD MANUFACTURE *for December, 1929, you gave an account (on page 342) of a proposal of Nyrop to manufacture chocolate by a process of spray-drying. I could not see how cacao beans, which are notoriously one of the most difficult materials to grind, could be reduced to a fine state of division by any mere process of spray-drying, but I have awaited developments in vain. Will you please inform me who Nyrop is, and whether anything further concerning his process has come to light?* (New Zealand.)

Although the early developments of this process were represented as being attractive, subsequent events have shown that there is little likelihood of making a practical proposition out of it. It has been carefully gone into by engineers in this country and has been tried out at one of our chocolate factories on a semi-large scale. Nyrop, we understand, is a Dane, but we do not know where he is at the moment.

312. *Would you please put us in touch, if possible, with an English manufacturer of paper containers for cheese, ice-cream, jellies, desserts, etc.? We would be interested in either manufacturing these containers on a royalty basis, or the outright purchase of the patents.* (Ottawa, Canada.)

Recommendations were made.

313. *We have received from one of our friends a copy of your journal, and being interested in the manufacture of raw marzipan, we write to enquire if you have any articles dealing with the manufacture of this.* (Scotland.)

We have not so far taken up this highly important matter, but are arranging an article from expert sources for publication in a future issue. You will find that both Brierley, Collier and Hartley, Ltd., and Hansella, Ltd., are in a position to supply plant and also much useful information.

314. *In connection with the manufacture of powdered soup we are finding difficulty in obtaining high quality dried vegetables and also a good, dried meat extract. Can you suggest anyone?* (Glasgow.)

Recommendations made.

315. *We enclose a sample of "rusks" used in the manufacture of sausages and would be greatly obliged if you would favour us with a recipe for same.* (London.)

This matter was put in hand.

316. *On page 174 of your June issue we read under No. 261 that there is now available a special mayonnaise mustard flour and a pasteurised mixed spice for use in mayonnaise. Could you give us the addresses of manufacturers of these two products?* (Holland.)

We advised writing to the Department of Agriculture, U.S.A., for this information.

317. *Names of makers of machines for crushing almonds required.* (London.)

J. Harrison Carter, Ltd., Brierley, Collier and Hartley, Ltd., and Hansella, Ltd., are able to supply machines for this purpose.

318. *We shall be obliged for the name of any firms who blanch and sell decorticated Brazil nuts.* (London.)

A firm was suggested.

319. *Names of makers of glass jam jars wanted.* (London.)

Several firms recommended.

320. *Could you give me the address of a maker of dry ice?* (Glasgow.)

The Carba Dry Ice (England) Syndicate, The Imperial Chemical Industries, Ltd., and The Carbon Dioxide Company, Ltd.

321. *Names of makers of galantine moulds required.* (London.)

Names supplied.

322. *We should esteem it a favour if you could supply us with some good recipes for tomato soup.* (Jersey.)

Tomato Soup.

84 galls. pulp from machine, or its equivalent in canned pulp.
28 galls. water.
12 lbs. salt.
12 lbs. butter and 11 lbs. sugar.
6 lbs. flour.
10 lbs. chopped onions.
½ lb. chopped garlic.
6 ozs. ground white pepper.
6 ozs. bay-leaves.
1 oz. powdered Saigon cinnamon.

Place the butter and pulp in kettle and bring to a boil; then add the onions and garlic and simmer one hour, adding water to make up for loss by evaporation. When the cook is half finished add the bay-leaves, and when within ten minutes of the finish, add the salt, sugar and pepper, and two minutes before the time is up add the cinnamon and the flour mixed with water; boil two minutes, turn off steam, run through rotary pulper or shaker, place in cans, seal and process No. 3 cans forty-five minutes at 240°.

Condensed Tomato Soup.

120 galls. pulp from machine or its equivalent in canned pulp.
1 gall. water (cold).
14 lbs. salt.
12 lbs. sugar.
15 lbs. onions, chopped fine.
2 lbs. butter.
1 lb. beef extract.
5 lbs. corn starch.
6½ ozs. ground white pepper.
1 oz. ground Saigon cinnamon.
½ oz. mace.

Place the pulp and butter in a kettle and bring to a boil, and then add the onions and cook forty minutes. When the cook is within ten minutes of the finish, add the extract of beef, salt, sugar, and pepper; when within two minutes add the cinnamon and mace; mix the cold water and corn starch, stir in, and when it boils turn off steam, then run through rotary pulper or shaker, place in cans, seal and process No. 1 cans thirty minutes at 240°.

323. *Please give us names of manufacturers of dextrose.* (London.)

Names supplied.

324. *Could you possibly give us the name and address of the representative in California for Feodora chocolate?* (U.S.A.)

The Schokoladenfabrik Tangermünde is represented there by Wm. Fleissner Co., 853 Arguello Blvd., San Francisco.

325. *I am fitting up a small laboratory in our factory and should be glad if you would recommend textbooks which would help me in the analysis of foodstuffs.* (Glasgow.)

Recommendations were made of suitable books for the purpose.

326. *Kindly supply me with the latest information on the relation of vitamin content to canning and preserving operations.* (St. Leonards-on-Sea.)

This is a big subject and carries an extensive literature, but a selection of references was submitted to the enquirer.

327. *Information on the use of sodium nitrite in curing of meats requested. Is it permissible to use this substance in this country?* (Stourbridge.)

The enquirer is referred to an article by Dr. Moulton to be published in the September issue of FOOD MANUFACTURE. See also "The Curing of Bacon and Ham," by Dr. E. H. Callow, p. 225, August, 1930, and A. Samson's remarks on p. 266, September, 1930. With regard to the second part of the question the Minister of Health states that the use of sodium nitrite is prohibited, as under the Public Health (Preservatives, etc., in Food) Regulations, 1925-1927, meat must not contain any added preservative.

328. *Could you oblige us with recipes for lemonade crystals and lemonade powder?* (Bishop Auckland.)

A recipe for lemonade crystals was given in the June, 1930, issue, p. 168, and for lemonade powder in the September, 1930, issue, p. 265.

329. *I should be obliged if you could supply me with a recipe for the manufacture of medium quality lemon curd.* (London.)

Rather than give any specific recipe, which could not be satisfactory (except by luck) in absence of information relating to consistency and flavour desired, prices, plant available, and so on, we quote below a series of basic formulæ, partly from Campbell and partly from an early issue of FOOD MANUFACTURE. Also, see Taylor's article in the May, 1931, issue.

Lemon Curd.

	1.	2.	3.	4.	5.	6.
Sugar ..	40 lbs.	56 lbs.	50 lbs.	35 lbs.	70 lbs.	70 lbs.
Corn Syrup	14 lbs.	14 lbs.	50 lbs.	35 lbs.	20 lbs.	56 lbs.
Butter ..	12 lbs.	12 lbs.		6 lbs.	18 lbs.	
Margarine..			10 lbs.			8 lbs.
Eggs ..	8 doz.	21 doz.	21 doz.	10 doz.	20 doz.	* See below
Lemons ..	10 doz.			70 doz.		
Lemon Gratings		2 lbs.			1½ doz.	
Lemon Juice		16 lbs.			10 doz.	
Lemon Oil..			1¼ ozs.		½ oz.	4 ozs.
Citric Acid	½ lb.		20 ozs.	½ lb.	6 ozs.	1½ lbs.
Cornstarch	2 lbs.		4½ lbs			
Gelatine ..			4 ozs.			
Salt.. ..			10 ozs.			1 lb.
Water ..			1½ gals.			

Boil sugar and corn syrup to 240° F. Add grated lemon rind and the juice. Turn off steam and gradually cool to 180° F. Stir in the butter. Slowly add beaten eggs and then citric acid. Mix well. (The temperature should be now about 100° F). Add cold cornstarch paste. In the case of No. 3, dissolve the gelatine in the 1½ gallons water by slowly warming, then cool before adding the cornstarch and salt. Cool quickly, fill, and cap.

*In the case of No. 6 for eggs and cornstarch is substituted:

3 lbs. dried egg yolk,
3 lbs. dried egg albumin,
12½ lbs. flour,

each rubbed in a gallon of water and stood overnight. Next morning they are mixed together and strained through a 30-mesh sieve. The boiling process is as follows:

Melt 8 lbs. margarine (or equal parts margarine and butter) in a 40-gallon steam pan. Add 56 lbs. glucose and bring mixture to the boil. Add 70 lbs. sugar and dissolve. Add the egg mixture (produced as above) and stir in 1 lb. salt. Boil for a few minutes and turn off steam. Stir in 1½ lbs. citric acid. Pass the whole through a fine copper sieve and allow partly to cool. Add 4 ozs. lemon oil and 1 drachm lime oil. Colour suitably. Fill into containers while hot.

330. *Reasons for the tendency of lemon curd to crack and form a watery solution round the jar required.* (Stockton.)

Cracking and the formation of liquid are usually caused by a shortage of gluten and albumen. Pure gum tragacanth or starch or egg albumen is often added as a remedy. Care should be taken to see that the flour is highly glutinous. Cracking may also arise from the colour employed. A neutral colour, not an acid one, should be used.

331. *Would you kindly inform us if citrus pectin has any advantage over apple pectin, and if we are right in assuming that the former would be used in only orange or lemon marmalade? What are the chief advantages in the use of pectin and what are its chief properties?* (London.)

It is laid down that marmalade must be made from citrus fruit only; hence no apple pectin may be used in its manufacture.

So far as we know there is no objection to the addition of citrus pectin to other jams. It has often been practised and would be impossible to detect. As purchased in powdered form it makes a colourless, tasteless jelly and is entirely unobjectionable.

It has some advantage over the liquid apple pectins in costing less for storage and transport; also it keeps well, whereas if a tin of liquid pectin is once opened it must be used quickly.

Pectin is derived from pectose, which is present in ripe fruits. By boiling the fruit with water or cooking under pressure or boiling with dilute citric or tartaric acids, the pectose is converted into pectin.

Pectin is a reversible colloid, and is soluble in water or dilute acids, forming a thick viscous liquid. It is precipitated from solution by alcohol or acetone as a jelly.

It is sold as a viscous fluid with about 3 per cent. pectin, or in powder form.

A mixture of pectin, sugar and acid in the correct proportions will set to a jelly when cold.

332. *Will you be good enough to put us in touch with any reliable firms who can carry out the installation of a plant for fat rendering and also beast tripe dressing?* (Liverpool.)

This was done. See also article on this subject to appear in next month's issue.

333. *Names and addresses of suitable firms supplying centrifugal separators required.* (Liverpool.)

These were supplied and the enquirer was also referred to advertisements in FOOD MANUFACTURE and the FOOD INDUSTRIES MANUAL.

334. *Kindly supply us with a formula for ice-cream powder.* (Leeds.)

See reply to enquiry No. 229, page 145, May, 1931.

335. *Kindly supply us with some information on the making of custard powder.* (Leeds.)

You might use as a basis 60 lbs. of cornflour and 40 lbs. of arrowroot, but formulæ and method in detail depend on the plant available, quality of product, amount of care bestowed, and so on. Mix the vanillin or essence of vanilla intimately with four times its weight of the main bulk of cornflour and arrowroot mixture. If a coloured product is desired, the powder colour should first be dissolved in warm water in the proportion of ½ oz. to the pint, and this solution is then thoroughly ground into the batch, which should afterwards be dried. To make sure that the colour is evenly distributed throughout, the dried powder should be milled, which will avoid specks. Finally, add the concentrated flavoured powder to the coloured base and well mix with the aid of a good mixing machine.

336. *You commented in your editorial notes of November, 1927, on the investigations by Chace and Church on the ethylene colouring of fruit. I shall be grateful for more information as to method of applying the gas, etc.* (South Africa.)

The treatment is carried out in any reasonably gastight shed or room. A temperature between 65° and 70° F. should be maintained. The concentration is 1 cu. ft. of ethylene to 1,000 cu. ft. of air space. The gas may be obtained (firms named) in steel cylinders with automatic regulator, compressed to about 1,000 lbs. per square inch. Heating is supplied by a non-glow type of electric heater or by hot pipes. Lights should be kept away, especially from the point of injection, although for explosions the concentration of ethylene in air is 3·3 per cent. At the concentrations used there is no danger of anæsthesia.

It is claimed that ethylene greatly improves the colour, flavour, texture, and aroma as compared with the "ageing" or "sweating" method. It also, in certain cases again, accelerates ripening. It stimulates enzyme processes and the breakdown of starch into sugar.

By far the largest use of ethylene for treating fruits and vegetables is in the citrus industry. Professor R. B. Harvey of the Minnesota College of Agriculture states that it is quite practical in ripening all green tropical and other fruits, but E. M. Chace, Chemist in Charge, Laboratory of Fruit and Vegetable Chemistry, U.S. Department of Agriculture, Washington, D.C., finds that it cannot be satisfactorily used with peaches or apricots, except on types that do not naturally soften uniformly (temperature here should be 75° to 80° F. and humidity as low as possible).

He says, further, that there seems no possibility of using the process on cherries or prunes; that his limited experience with apples leads him to believe that ethylene may have some effect on the yellow-green colours, but little or none on the reds. Little is known with regard to pineapples, and he says that in all probability a large quantity of grapefruit which has undergone ethylene treatment has been used for canning. It appears to him at present that ethylene as a pre-treatment for fruit for commercial canning has a very limited use. Many canneries consider the texture of pears of more importance than the colour, and ethylene affects the texture to a greater extent than it does the colour. The treatment will soften pears in about five or six days (temperature 75° to 80° F.; humidity can be quite high without detriment).

Richard Carter (*The Fruit Grower*, p. 633, April 19, 1928), writing of Canadian practice, records great success in the application of ethylene for ripening green tomatoes and blanching celery.

Chace emphasises the importance of maintaining a uniform temperature and good circulation in the ethylene ripening room.

For further information the enquirer is referred to the following literature:

R. B. Harvey (*Minnesota Agric. Expt. Sta. Bull.*, No. 247, 1928) gives instructions for artificial ripening of fruits and vegetables by ethylene.

J. Dufrenoy (*Rev. Bot. Appl. Agric. Trop. Bull.*, 1929, p. 441) discusses the use of ethylene in the ripening of tropical fruits.

L. O. Regeimbal (*Wisconsin Hort. Expt. Sta. Bull.*, No. 5, 1928) describes ripening experiments with bananas, tomatoes, melons, and celery.

E. M. Chace (*Food Research Division Contribution*, No. 107, U.S. Dept. of Agriculture, 1931).

E. M. Chace (*The Canner*, Sept. 15, 1928) describes use of ethylene for softening of Bartlett pears intended for canning or drying.

D. T. Englis and C. D. Zannis (*J. Am. Chem. Soc.*, p. 797, 1930) discuss the effect of ethylene on activity of diastase and invertase.

337. *Is it a fault when the oil comes out of marzipan in the working? What is the explanation of this and how may it be overcome?* (Airdrie.)

See reply to query No. 313 above.

338. *Can you supply us with information on the use of soya beans in chocolate manufacture?* (Esthonia.)

Some literature on this subject was forwarded.

339. *We require some recipes for the manufacture of gravy salt.* (Gloucester.)

An article on this subject appeared in the May issue of this journal, *q.v.*

340. *What British manufacturers of automatic can-making machinery are there?* (Christchurch, New Zealand.)

Several recommendations were made.

341. *What would be a suitable preservative for fish cakes (made from fish and potatoes only) and also for fish pastes?* (Blackpool.)

According to the Public Health (Preservatives, etc., in Food) Regulations of 1925, no article of food, with certain exceptions as to sausages and sausage meat, fruit wines, jellies, etc., shall be manufactured for sale which contains any added preservative or any of certain prohibited colouring matters. Common salt, acetic acid or vinegar, herbs, spices, and essential oils are not regarded as "added preservatives" within the meaning of the Act, but as none of these is likely to be suitable for your fish products, it appears that you will have to market them without any preservative. In the case of the fish paste, if it is being sold in jars, heat sterilisation could be adopted as an alternative to chemical preservation.

Financial News

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1930–1931)

1930. February 6	... ...	4½ per cent.
,, March 6	... ...	4 ,,
,, March 20	... ...	3½ ,,
,, May 1 ...	... ...	3 ,,
1931. May 14 ...	... ...	2½ ,,

Changes in management and administration of the affairs of **W. Hill and Son, Ltd.,** have proved satisfactory, and during the financial year ended December last a gross trading profit of £40,489 was realised as compared with £22,593. The balance of net profit, after debiting £14,746 for depreciation of fixed assets and £9,235 for income-tax, was £14,233 as compared with £3,602 in 1929, this amount being insufficient to extinguish the debit balance standing to profit and loss. Registered in 1901, the company now has an authorised share capital of £400,000, all of which has been issued and paid up in the form of £200,000 7½ per cent. cumulative preference £1 shares and £200,000 ordinary £1 shares. The debit balance brought forward from 1929 amounted to £14,939, so that after deducting the net profit realised during the past year there remains a debit balance of £706 to go forward to 1931. Certain assets of the company have been subjected to a revaluation, which shows the book value to be in excess of present-day value, and proposals for a reorganisation of the capital were recently submitted to the shareholders. Recently the preference shares were quoted at 14s., and the ordinary shares at 6s. 3d.

During the twelve months to March 31 last the gross profit realised by **Spiers and Pond, Ltd.,** amounted to £119,977, which figure compares with £126,626 for the previous year. A decrease in dividends and other income, and additional fees and taxes, caused the margin of net profit to shrink from £108,438 to £96,440, necessitating a reduction in the rate of ordinary dividend from 15 per cent. to 14 per cent. This company was registered in 1882, and the authorised share capital is now £1,200,000, of which a total of £913,123 has been issued and paid up, comprising £497,560 in 6½ per cent. cumulative preference £1 shares and £415,563 in ordinary shares of 10s. denomination. A summary of the 1930-1931 appropriation account is given below :

	£
Brought forward from 1929-1930 ...	7,010
Net Profit—year ended March 31, 1931	96,440
Disposable Balance	£103,450
	£
6½% dividend on £497,560 Cumulative Preference £1 Shares	32,341
14% dividend on £415,563 Ordinary 10s. Shares	58,179
Additional Fees	4,823
Allocated to Sickness and Benevolent Fund ...	2,000
Carried forward to 1931-1932	6,107
	£103,450

The following are the principal balance sheet items :

	March 31, 1931.
	£
Stocks	86,351
Debtors	57,759
Cash	78,211
Government Securities	49,760
Freehold and Leasehold Properties, less Debenture Redemption Fund	977,395
Plant, Furniture, and Equipment	235,311
Creditors	94,682
Reserve	115,000
5% First Mortgage Debenture Stock	400,162

The debenture stock was recently marked at 97, and the ordinary shares at 13s. The preference shares are quoted around par.

A further substantial increase in gross profits is disclosed in the accounts of the **International Tea Company's Stores, Ltd.,** covering the financial year to the end of April last, while at £696,806 the balance of net profit shows an increase of £80,209 in relation to the previous year's result. The ordinary dividend has been maintained at the rate of 30 per cent. for the third successive year, and in addition to transferring £50,000 to reserve, a dividend equalisation reserve has been started by means of an allocation of £100,000. The capital ranking for dividend aggregated £3,217,599, made up of £600,000 6 per cent. first cumulative preference £1 shares, £1,368,161 7 per cent. "A" cumulative preference £1 shares, and £1,249,438 ordinary shares of 5s. each. The final appropriation figures for 1930-1931 are as follows :

	£
Brought forward from 1929-1930 ...	132,297
Net Profit—year ended April, 1931 ...	696,806
Disposable Balance	£829,103
	£
6% dividend on £600,000 First Cumulative Preference £1 Shares	36,000
7% dividend on £1,368,161 "A" Cumulative Preference £1 Shares	94,771
30% dividend on £1,249,438 Ordinary 5s. Shares	374,829
Transferred to Reserve	50,000
Allocated to Dividend Equilisation Reserve ...	100,000
Income-tax Allowance	40,000
Carried forward to 1931-1932	133,503
	£829,103

The following are the main balance sheet items :

	April, 1931.
	£
Cash	480,655
Investments in British Government Securities and Dominion Corporation Stocks	304,413
Stocks	916,131
Debtors	395,109
Shares in Subsidiaries	684,730
Owing to Subsidiaries, net	216,611
Creditors	472,432

The 6 per cent. preference shares were recently quoted at 24s., the "A" preference shares at 25s. 3d., and the ordinary shares at 22s. 9d.

The net profit realised by **Clark's Bread Co., Ltd.,** during the twelve months to March 31 last was £14,833, which amount compares with £15,813 realised in 1929-1930, and, after adding the sum of £7,653 brought forward from the previous appropriation account, there was a disposable balance of £22,486, enabling the dividend of 15 per cent. to be maintained, but without any share bonus. Registered as a private company in 1893, and converted into a public company in 1928, the authorised share capital was increased to £75,000 in July, 1930, and of this amount £60,500 has been issued and paid up in the form of ordinary shares of 10s. denomination. The following is a summary of the 1930-1931 appropriation account :

	£
Brought forward from 1929-1930 ...	7,653
Net Profit—year ended March 31, 1931	14,833
Disposable Balance	£22,486
	£
15% dividend on £60,500 Ordinary 10s. Shares	9,075
Transferred to Taxation Reserve	320
Written off Capital Increase Expenses Account	216
Written off Shopfitting Suspense Account ...	787
Carried forward to 1931-1932	12,088
	£22,486

The shares changed hands recently at 22s. 8d., upon which basis the yield is £6 12s. per cent.

The final dividend of 12½ per cent. announced by **Geo. Bassett and Co., Ltd.**, makes 20 per cent. for the year ended May 31 last.

The following dividends have been postponed:

British Can Co., Ltd.: Preference dividend due July 1.

Crosse and Blackwell, Ltd.: Preference dividend due July 19.

Mellin's Food, Ltd.: Preference dividend due June 20.

C. and E. Morton, Ltd.: Preference and preferred ordinary dividends due July 15.

STOCK AND SHARE LIST

	July, 1931.	*Par Value.*	*June*, 1931.
Aerated Bread: Ord. ...	19/6	£1	19/-
6½% Pref.	21/6	£1	20/-
Apollinaris: Ord.	4/2	£1	4/1
Assoc. Biscuit: 6½% Pref. ...	22/3	£1	22/11
Avery (W. and T.): Ord. ...	45/9	£1	40/-
5% "A" Pref.	4½	£5	4½
5½% "B" Pref. ...	20/-	£1	20/-
Benger's Food: Ord. ...	30/-	£1	30/9
6% Pref.	5 1/16	£5	4⅞
Bovril: Ord.	24/-	£1	22/9
Deferred	35/9	£1	30/-
6% Pref.	23/-	£1	22/6
4½% Deb.	91	£100	93
British Aluminium: Ord. ...	29/-	£1	25/6
6% Pref.	19/11	£1	19/3
British Thomson Houston:			
7% Pref.	23/-	£1	23/9
Bucknall (H.) and Sons:			
Ord.	22/-	£5	22/-
Cadbury: 6% Pref. ...	24/-	£1	23/9
8% 2nd Pref.	28/8	£1	28/9
Callard, Stewart and Watt:			
6% Pref.	18/6	£1	18/-
Carrs: 6½% Pref.	21/3	£1	21/-
Cerebos: Ord.	6	£1	5⅞
Chivers: 6% Deb.	101	£100	102
Cinzano: 7½% Pref. ...	20/6	£1	20/2
Clark's Bread: Ord. ...	22/8	10/-	22/6
Cow and Gate: 7½% Pref.	22/9	£1	22/9
Criterion Restaurants: Ord.	6/10	5/-	6/11
Crosse and Blackwell: Ord.	10d.	1/-	11d.
7½% Pref.	5/8	15/-	5/10
6½% Deb.	82	£100	85
Dutch Margarine: 5½% Pref.	21/3	£1	21/-
English and Dutch Meat:			
8% Deb.	49	£100	50
Ewart and Son: Ord. ...	10/4	5/-	10/6
16% Pref.	19/3	10/-	19/6
Foster Clark: Ord.	40/-	10/-	42/-
Fry's: 8% "B" Preferred	22/4	£1	22/3
Fullers: Ord.	34/3	£1	34/-
7% Pref.	20/6	£1	20/5
Gordon Hotels: Ord. ...	7/3	£1	7/6
4% Perp. Deb.	67	£100	68
Grape Produce:			
8% Ptg. Pf'd. Ord. ...	1/3	5/-	1/2
H.P. Sauce: Ord.	92/3	£1	86/-
Hill (W.): Ord.	6/3	£1	7/-
Holbrooks: Ord.	11/9	5/-	12/6
5% Pref.	4⅜	£5	4⅜
Home and Colonial: Ord. ...	14/8	4/-	13/6
15% Cum. Ord.	53/-	£1	52/6
6% Cum. Pref.	5⅞	£5	5¾
Honywood Hotels: Ord. ...	1/6	2/6	1/8
8% Pref.	12/3	£1	15/-
Hovis: 6% Cum. Pref. ...	23/6	£1	23/8
Imperial Chemical: Ord. ...	15/-	£1	13/3
Deferred	4/3	10/-	3/-
7% Cum. Pref.	21/-	£1	20/-
International Tea: Ord. ...	22/9	5/-	20/-
6% 1st Pref.	24/-	£1	23/-
7% "A" Pref.	25/3	£1	24/6
Jones (R. E.): Ord.	1/4	5/-	1/3
10% Pref.	6/7	£1	6/4
Jurgens:			
7% Cum. Partg. Pref....	24/3	£1	24/-

	July, 1931.	*Par Value.*	*June*, 1931.
Kia-Ora: Ord.	7/6	10/-	8/4
Liebigs: (Reg.)	10¼	£5	8⅞
(Bearer)	10¼	£5	8⅞
5% Pref.	96/-	£5	95/-
Lipton: Ord.	5/7	1/-	5/6
5% 1st Pref.	8/10	10/-	8/9
6% Pref.	11/-	10/-	10/9
6% Deb.	103	£100	103
Lovell and Christmas: Ord.	8/9	£1	8/9
Lyons: Ord.	93/9	£1	90/6
"A" Ord.	93/-	£1	90/3
5% Pref.	21/3	£1	21/-
6% Preferred Ord. ...	22/3	£1	23/2
7% Pref.	27/6	£1	27/6
8% Pref.	30/5	£1	30/3
Manbre and Garton: D'f'd.	13/6	2/-	9/6
Mather and Platt: Ord. ...	26/-	£1	22/-
Maypole Dairy:			
20% Preferred	17/3	5/-	17/-
Deferred	4/7	2/-	4/3
5% Pref.	20/-	£1	19/6
Mazawattee Tea: Ord. ...	11/9	6/8	11/3
Meadow Dairy: 7½% Pref.	24/6	£1	23/6
Mellin's Food: 6% Cum. Pref.	3/9	£1	1/10
Molassine: 7% Pref. ...	12/9	15/-	12/6
Nathan (J.): Ord.	1/6	1/-	1/6
7% Pref.	15/9	£1	15/6
8% Preferred	8/-	10/-	7/6
Nestlés: 8% Pref.	30/10	£1	30/9
Parkinson and Cowan: Pref.	20/-	£1	21/-
Pascall (J.): 8% Preferred	5/6	£1	5/-
Peak Frean: 5% Pref. ...	18/1	£1	18/2
8% "A" Pref.	25/-	£1	25/-
Radcliffs Edible: Ord. ...	1/2	1/-	1/2
8% Pref.	7/-	10/-	6/10
Radiation: Ord.	34/3	£1	30/6
6% Pref.	22/9	£1	21/9
Rowntree: 7% 2nd Pref. ...	21/9	£1	21/6
Salt Union: Ord.	23/2	£1	18/3
7% Pref.	26/9	£1	26/6
4½% Deb.	83	£100	84
Schweppes: Deferred ...	21/-	£1	20/6
4% Deb.	77	£100	76
Scribbans: Ord.	13/6	£1	13/4
Deferred	1/9	1/-	1/8
Slaters and Bodega: Ord. ...	26/-	£1	26/3
6½% 2nd Pref.	21/6	£1	21/6
Smithfield and Argentine Meat:			
7½% Cum. Pref.... ...	15/6	£1	15/-
Smith's Potato Crisps: Ord.	8/8	5/-	8/6
Spiers and Pond: Ord. ...	12/6	10/-	13/3
6½% Pref.	20/-	£1	20/-
5% Deb.	96½	£100	96
Spillers: Ord.	28/3	£1	25/9
6% Pref.	21/11	£1	21/9
Deferred	12/-	£1	9/11
Strand Hotel: Pref'd. Ord.	65/-	£1	65/-
Tate and Lyle: Ord. ...	39/-	£1	36/-
6½% Pref.	24/6	£1	24/2
Trust Houses: Ord. ...	14/3	£1	14/-
Unilever: Ord.	36/-	£1	30/-
7% Preferred	25/2	£1	24/8
Union Cold Storage:			
6% Pref.	20/8	£1	20/3
7% Pref.	21/3	£1	20/6
10% Pref.	27/6	£1	27/-
United Caterers: Ord. ...	8d.	5/-	7½d.
United Dairies: Ord. ...	34/-	£1	32/9
6% Pref.	23/-	£1	22/6
United Glass Bottle: Ord. ...	18/1	£1	16/-
Preferred	21/-	£1	20/9
United Molasses: Ord. ...	11/6	£1	6/3
6% Pref.	11/-	£1	7/6
Van den Berghs:			
15% Preferred Ord. ...	11/-	5/-	11/-
Victoria Wine: Ord. .	5/9	5/-	6/6

Current Literature

Fruit and Vegetable Products

217. Composition of Dried California Prunes. L. Gale and W. V. Cruess. (*Fruit Prod. Journ.*, 1931, June, p. 302.)
218. New Chemical from Apple Pomace. E. G. Moore. (*Ibid.*, p. 305.)
219. Artificial Colours for Fruit Products. (*Ibid.*, p. 308.)
220. Effect of Acid on the Spoiling of Canned Prunes. E. M. Mrak and P. Richert. (*Ibid.*, p. 310.)
221. Dehydrating Vegetable Products. M. Wharton. (*Food Industries*, 1931, July, p. 294.)

Cereal Products

222. Loaf Production Costs. (*Food Industries*, 1931, July, p. 293.)
223. Effect of Heat on the Biological Value of Cereal Proteins. A. F. Morgan. (*Journ. Biol. Chem.*, 1931, March, p. 771.)
224. Acidity in Stored Flour. A. H. Johnson and J. Green. (*Cereal Chem.*, 1931, March, p. 134.)

Dairy Products

225. Properties of Irradiated Milk. G. C. Simplee, G. E. Flanigan, and O. J. Kahlenberg. (*Journ. Biol. Chem.*, 1931, May, p. 773.)
226. Thermophilic Bacteria in Milk and Plate Counts. H. A. Harding. (*Food Industries*, 1931, July, p. 290.)
227. Purification of Creamery Wastes. M. Levine. (*Ibid.*, p. 308.)

Miscellaneous

228. Air Conditioning and Fermentation Control. R. Fennema. (*Food Industries*, 1931, July, p. 284.)
229. Industrial Importance of Sugars. (*Ibid.*, p. 288.)
230. Treating Raw Canning Products with Ethylene. (*Ibid.*, p. 297.)
231. Selective Irradiation of Food Products. (*The Glass Packer*, 1931, July, p. 333.)
232. Troubles with Flavouring Extracts in the Dairy Industry. R. M. Washburn. (*Ibid.*, p. 347.)
233. Effect of Frost Injury on Canning Qualities of Fruits. P. F. Nichols. (*Canner*, 1931, July, p. 11.)
234. Preventing Scum on Brine Pickles. O. Rahn. (*Ibid.*, 1931, July, p. 42.)

Analysis

235. Reducing Sugar Determination in the Apple. H. K. Archbold and E. M. Widdowson. (*Biochem. Journ.*, 1931, p. 101.)
236. Composition of Commercial Palm Oils. T. P. Hilditch and E. E. Jones. (*J. Soc. Chem. Ind.*, 1931, p. 171.)
237. Determination of Lecithin in Fats. E. Foyn. (*J. Pharm. Chim.*, 1931, p. 465.)
238. Fat Contents of Cacao Beans. B. Rewald and H. Christlieb. (*Chem. Ztg.*, 1931, p. 393.)
239. Vitamin A Content of Oats. C. R. Meyer and R. A. Hetler.

Identification of Mazzard and Mahaleb Cherry Rootstocks. By H. B. Tukey. New York State Agricultural Experiment Station, Geneva, N.Y. Circular No. 117, December, 1930.

Xenia and Metaxenia in Apples. By B. R. Nebel. *Ibid. Technical Bulletin*, No. 170, December, 1930.

Aphids as Vectors of Leafroll among Sprouting Potato Tubers. By F. C. Stewart and H. Glasgow. *Ibid. Technical Bulletin*, No. 171, December, 1930.

Filberts. By G. L. Slate. *Ibid. Bulletin*, No. 588, December, 1930.

A comprehensive account of the history, botany, cultivation, diseases, harvesting, storing, and marketing of these nuts. A plea is made for more extended cultivation in the States.

A New Method for Enzymic Clarification of Unfermented Apple Juice. By Z. I. Kertesz. *Ibid. Bulletin*, No. 589, December, 1930.

An enzyme decomposing soluble pectin is proposed as an agent for assisting in the clarification of apple cider. This enzyme acts on pectin and produces no changes in starches or proteins. During the decomposition of the pectin of the apple juice by the enzyme, some insoluble materials are formed. These insoluble substances, together with other substances responsible for the cloudiness of cider, are easily removed by filtration or centrifugation, leaving a crystal clear product which may be pasteurised and bottled within twenty-four hours after pressing the cider. The product is very palatable and possesses no " cooked " taste.

Cucumber Disease Investigations on Long Island. By E. E. Clayton. *Ibid. Bulletin*, No. 590, January, 1931.

Potato Storage and Storage House. By W. Stuart. U.S. Department of Agriculture. *Farmers' Bulletin*, No. 847. Issued July, 1917; revised November, 1930.

Careful investigations during several seasons have demonstrated that losses in storage can be largely prevented by the proper construction and management of storage houses, concerning which particulars are given in this bulletin. Methods of handling the crop in relation to storage are also discussed.

Diseases of Apples in Storage. By C. Brooks, J. S. Cooley, and D. F. Fisher. *Ibid. Farmers' Bulletin*, No. 1160. Issued September, 1920; revised October, 1930.

Particulars and illustrations of the diseases that appear on apples in storage, and the control of these, are given in some detail.

Tomatoes for Canning and Manufacture. By J. H. Beattie. *Ibid. Farmers' Bulletin*, No. 1233. Issued October, 1921; revised November, 1930.

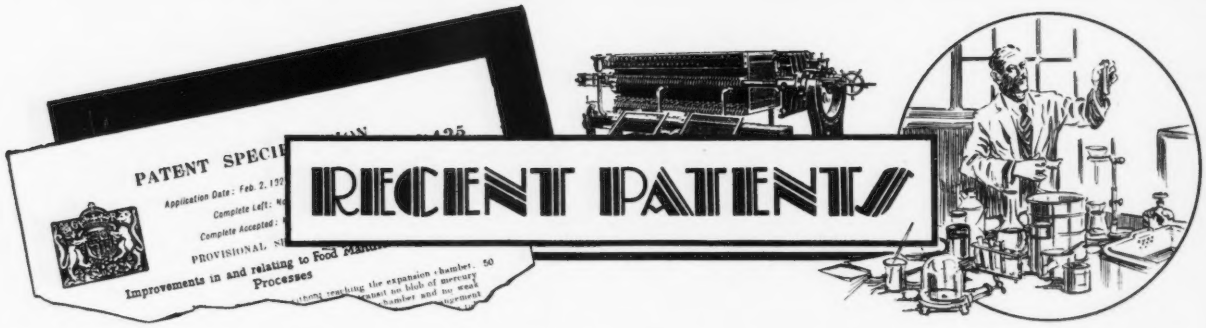
Good soil, good disease-free seed of suitable varieties, strong well-grown plants, careful setting, good cultivation, and control of diseases are essential to satisfactory yields and returns. These points are fully discussed. The methods followed by canners to obtain a supply are also described.

Growing Sweet Corn for the Cannery. By J. H. Beattie. *Ibid. Farmers' Bulletin*, No. 1634. Issued December, 1930.

This ranks among the three most important vegetables canned in U.S.A. Detailed information is given on climatic requirements, methods followed by canners to provide for supplies, soil and fertility requirements, cultivation in its various aspects, yields, factory wastes, diseases, and insects.

Citrus Fruit Growing in the South-West. By A. D. Shamel, C. S. Pomeroy, and R. E. Caryl. *Ibid. Farmers' Bulletin*, No. 1447. Issued July, 1925; revised November, 1930.

The commercial growing of citrus fruits in south-western U.S.A. is limited to districts in California and Arizona. The recent rapid growth and success of the industry has been made possible by the utilisation of the results of scientific research. New methods of propagation, orchard development, frost protection, pest control, and handling and transporting the crop have been originated and introduced. This bulletin gives an account of history, development, kinds and varieties, propagation, details of orchard cultivation, cost of production, and labour conditions.



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Latest Patent Applications

18208. LASZLO, L.: Preservation of foodstuffs. June 23.

18431. WATERS, H. L. H.: Ripening cheese. June 25.

17873. ATKINSON, J. S.: Heating food. June 20.

17711. WEBB, H. J. H.: Cold storage chambers for food, etc. June 18.

16733. LINTON, F. A.: Foodstuffs. June 9.

Specifications Published

350,054. GREEN, L. E.: Machines for mincing or cutting up meat and other foodstuffs.

350,620. SIMCOCK, A. E.: Preservation by cooling of foodstuffs and the like exposed for sale.

350,684. MAYBURY, E.: Vitaminised food seasoning.

350,831. GATES, W. R. B. ST. J., and TAVROGES, J.: Peptonised food, and the method of manufacturing same.

351,360. LEWINSON, A.: Preparation of beverages.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts Published

Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued, on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

345,904. **Coating and preserving confectionery, fruit, etc.** MACKENZIE, A. F., 13a, Elgin Crescent, Shepherd's Bush, London.

Confectionery, fruit, and other edible substances are preserved by coating with an emulsion of sugar in a tasteless fat—*e.g.*, illipe butter—which is sold at normal room temperatures and melts at or below normal body temperature. Other edible substances may be added to the coating material for thickening, thinning, colouring, flavouring, etc., purposes—*e.g.*, flour, milk solids, Barcelona, cashew or other nuts, malt products, chlorophyll or oil of lemon. The materials are brought to a finely divided state before or during admixture, which may be effected in a conche or mélangeur. Specification 124,449 (Class 28 (i), Bread-making, etc., is referred to.)

345,363. **Food colouring or flavouring materials.** KOHNSTAMM AND CO., INC., H., 83, Park Place, New York, U.S.A.

A colouring or flavouring composition for candy, confectionery, and other foodstuffs is obtained by dissolving or dispersing a concentrated colour or flavour in glycerin or like solvent, or in a solution of invert sugar, glucose, or other sugar, or in a mixture of the solvents and sugar solution, then absorbing or incorporating the solution obtained in a solid filler consisting of carbohydrates of absorbent cellular or granular structure—*e.g.*, cane sugar, lactose, dextrose, or other powdered or crystalline sugars or mixtures thereof—and finally compressing the material to a firm cake. A small amount of a binder such as gum arabic or other vegetable gum may be added before compression. The tablet is deeply scored into divisions which can readily be detached, giving pieces of a definite colour, etc., content. In an example the composition consists approximately of 20 per cent. of colouring matter, 30 per cent. of solvent, 48 per cent. of lactose or other sugar, and 2 per cent. of an aqueous solution of gum arabic or other vegetable gum.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

CHEF.—519,873. **Tomato catsup, relish, and salad cream.** CHEF PRODUCTS, LTD., 20, Soho Square, London, W. 1. July 8. (Associated.)

POULTREX.—522,039. **Desiccated soups for sale in Great Britain only.** ROBERT GORDON ISRAEL, trading as Cookwell Supply Co., 22, Bunhill Row, Finsbury, London, E.C. 1. July 8.

BOK.—522,337. **Sugar confectionery.** J. LYONS AND CO., LTD., Cadby Hall, Hammersmith Road, Kensington, London, W. 14. July 8.

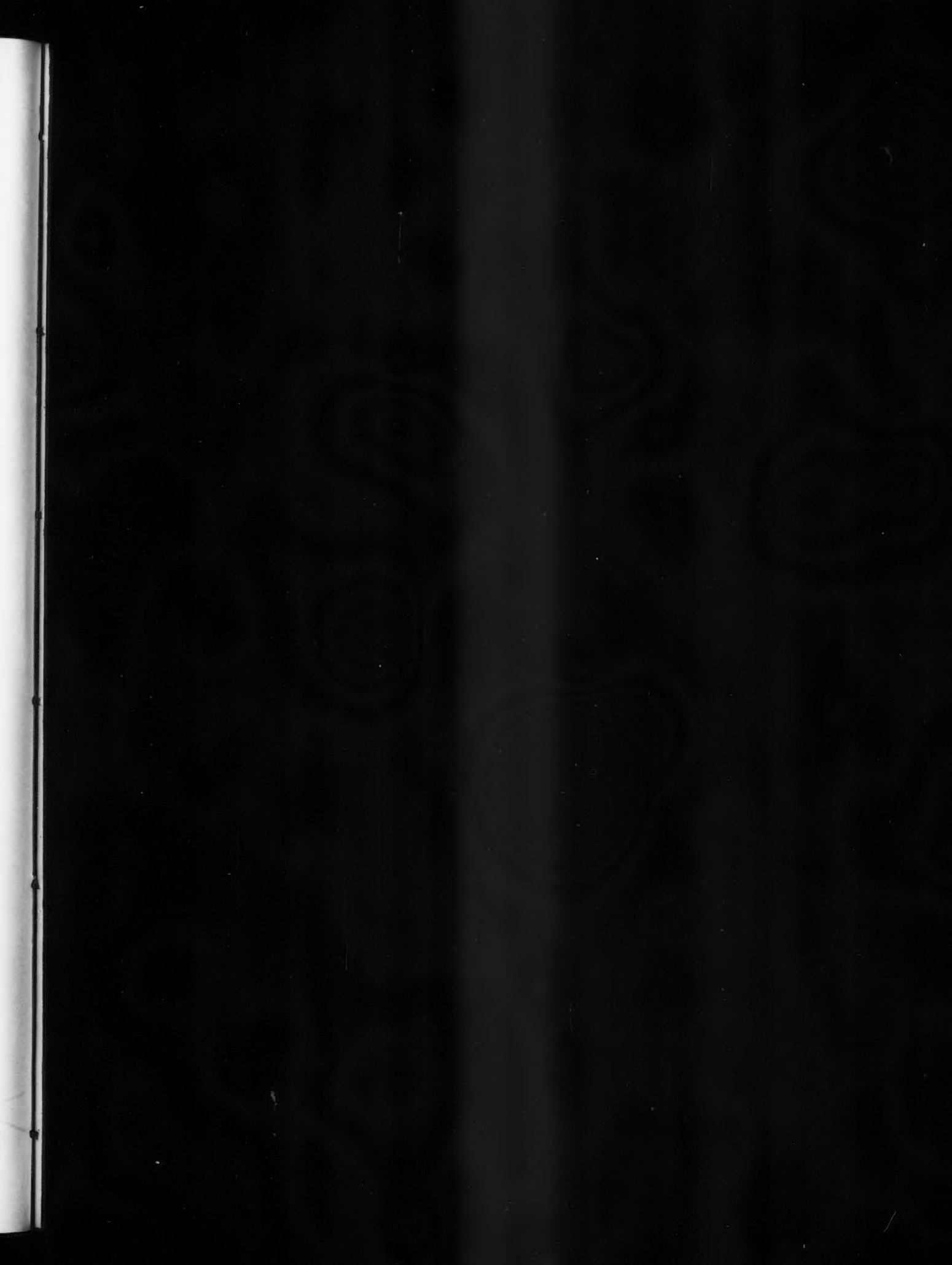
MONDACO.—522,770. **Milk, cream, and butter.** THE SOUTH WALES AND MONMOUTHSHIRE DAIRIES, LTD., Clarence Corner, Clarence Street, Pontypool, Wales, and 69, Fairoak Avenue, Newport, Monmouthshire. July 8.

TANGERO.—519,671. **Beverages (not alcoholic, not aerated, and not medicated) made from tangerines.** CROSBIE'S PURE FOOD CO., LTD., corner of Brent Road and Scott's Road, Southall, Middlesex. July 8.

ROSCRISPS.—522,801. **A bread preparation for use in the manufacture of sausages.** JAMES MCDOWELL WILSON, trading as Robert McDowell and Sons, 26, Torphichen Street, Edinburgh. July 8.

AMBER CLOUD.—522,539. **Tea and coffee.** ARCHIBALD GORDON GRANT, 6, Mathew Street, Liverpool. July 1. (Associated.)

BIZZY.—522,537. **Yeast.** THE STANDARD YEAST CO., LTD., Lamb Distillery, Church Street, Chiswick, London, W. 4. July 1.

POKER (PORTUGAL).—522,976. **Sardines in oil.** EMPREZA INDUSTRIAL DE CONSERVAS POKER, LIMITADA, 11, Rua Nova do Almada, Lisbon, Portugal. July 1.

WILLOWDALE.—521,668. **Butter.** E. M. DENNY AND CO., LTD., Hibernia Chambers, London Bridge, London, S.E. 1. June 24.